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THE SIGNS OF PRE-DEMENTIA PRÆCOX: THEIR SIGNIFICANCE AND PEDAGOGIC PROPHYLAXIS.[1]

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There is an ancient tradition that in oriental lands it is the duty of the practitioner of medicine to keep his patients from falling ill, and that the rewards that accrue to the physician in the Celestial Kingdom are in proportion to the number of days of health enjoyed by his patron. Further, the family doctor is held responsible, pecuniarily as well as morally, for the time lost in illness. While we recognize the fictitious character of this procedure, nevertheless, were it so, it would represent an ideal that is fortunately coming to its own in occidental lands—that prevention is the great goal toward which the science of medicine has turned its chief attention.

That birth and death cannot be modified will not be questioned so long as the race endures, but in the brief life span between, may not much of the sorrow and distress of sickness be removed by enlightened prophylaxis? Even the casual observer knows how fruitful the theme has been already, and the enthusiastic optimist believes he can see the passing of much preventible sickness in the near future. That which enlightened hygiene has done for the limitation and repression of the infectious diseases; what careful dietetics is doing for the control of disorders of metabolism; what orthopedics and gymnastics are doing for the relief and cure of physical defects, may not adequate

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psychological pedagogy do for certain forms of mental disorder? Rational mental teaching has shown its value in hysteria, and in many neurasthenoid and psychasthenic states. Is there a possible application of its principles for the very early stages of that which today we term dementia præcox, and, if so, what are the sources to which we must look for help?

The problem is far from being a new one in any sense of the word. It is as old as there are records of human observations, and in the past few centuries Willis,[2] Rousseau, Morel, Maudsley, Falret, Down, and others have been insistent on calling attention to the phenomenon, and each in turn attempted to awaken an active interest leading to the solution of a medicopedagogic problem propounded of old. At the present time there is little let-up in the question, but, for us at least, the leading minds are approaching it from the pedagogic rather than from the medical side, so much so that it almost seems that Hall's severe criticism is partly justified, at least when he writes[3] that "the years of puberty have been too much neglected by the physician. The years of senescence and of maturity have a rich literature, but there is a relative neglect of the morbid peculiarities of pubic life." And this is the most important period of human life, for at this time the sunlight of nature bursts its bounds and radiates into all the human faculties, stimulating them to their adult form. This is the period left too much to itself, trustfully and hopefully; sometimes, it must be confessed, neglectfully; or, as Meyer has well suggested,[4] "fatalistic has often been the attitude of those who have accepted hereditary tendencies as excuses for the bad conduct of children, and they have been left uncared for by reason of a lack of faith in those who should exert themselves the most to save them from themselves."

Meyer further writes: "Do not let us say that this (he is speaking of dementia præcox) is merely one of nature's methods of weeding out the unfit. Among the 25,000 persons who are today (1903) in the public and private institutions of New York State alone, there are many brilliant hopes buried, largely owing to a lack of knowledge of what some people need in the way of social and personal hygiene. Remember that some of the most illustrious members of the race have been dangerously near the borderland of insanity, and seem to have been great, although they showed obvious traces of the same misled instincts that completely wrecked others. Are such people not worth our help? Should not the home, the press, and the school mind some of the dangers and shape their ethics and methods accordingly?" That they are doing so is evident to anyone who will but

[2] Willis, 1672. "Many young people, in childhood intelligent to a degree and extremely teachable, so that by their learning and conversation they swept everyone into a state of admiration, afterward as they grew older turned out stupid and dull, and those who before were very beautiful in person afterward presented no grace or comeliness in their appearance." See also Morel, under head of syndrome called by him "Stupidity."

[3] Adolescence.

[4] Child Study Address, 1903.

glance at the current literature of school hygiene, wherein we see reflected the great effort that is being expended for a solution of many of the problems suggested.

Of these mental affections, that of dementia præcox offers some hope of progress. Just what is here meant by the term dementia præcox I shall not attempt to define further than by saying that the word stands for a provisional group of patients who gradually develop certain mental and physical characteristics first brought into special prominence by Hecker and Kahlbaum, amplified by Pick, and later developed and expanded by Kraepelin and his students—a group very clear as to its nuclear features, but misty in its outlying edges and far from constituting an unassailable synthesis—a fact well recognized by Kraepelin himself. Still, by its erection clinical psychiatry has been a great gainer, and the whole problem of types of personality has had a new light thrown upon it, which promises much for all investigators. The question at issue, however, is not what constitutes a diagnosis in mental disease;[5] but the fact that there are in some individuals certain deteriorating processes at work which result in fairly definite symptom-complexes or pictures is the feature that needs emphasizing.

Granting for the time being the possibility of a fairly constant and characteristic type of degeneration leading to the various grades of mental enfeeblement, the problem narrows down then to a consideration of the question, Are we in a position to make not a diagnosis of dementia præcox in the usual sense—for then the process has been too long in the making—but are we able in the light of newer investigations[6] of the types of individual psychological reactions to the surroundings to say that such and such a child is liable to undergo this particular type of mental stagnation or deterioration, and is it possible by taking proper heed of the little things to avoid a wasted life, or conserve in some degree, sufficient for ordinary needs, an individual who otherwise would pass to utter destruction?

To the asylum physician who with wide-open eyes works with the dead end-results, the dements, the question at first sight seems hopeless; to the teacher who with eyes half-opened sees the early signs of unnatural tire, unreasoning irritation, overreaction to slight stimuli, the inquiry is large with anxious hope.

Most observers who have studied dementia præcox have been

[5] As to the validity of diagnosis in mental disease, A. Meyer (Brit. Med. Jour., 1906, p. 757), contributes a discussion of more than usual value: "Diagnosis is merely a convenience of nomenclature, an expression for a group of facts. In psychiatry the facts occur in very complex combinations, and therefore a one-word diagnosis is almost sure to fall short of what it ought to do, namely, short of presenting the actual facts in the case, sufficiently to designate the etiologic, prognostic, and therapeutic status. Psychiatry has not yet reached and probably never will reach the stage where a small number of one-word diagnoses would be more than a formal index," etc.

[6] Illustrative cases are here omitted for sake of brevity. See Masselon's excellent study, Thèse de Paris, 1902, and also Jung's more recent monograph issued after this paper was prepared, Ueber die Psychologie der Dementia Præcox, Halle, 1907.

struck by the relationship of the symptom picture at the outset as well as in the advanced cases to the normal features of adolescent development. No one has expressed it better than Hall when he writes: "There are two missing links indispensable to a full acquaintance with the many forms of precocious mental decay; first and chiefly, knowledge of the actual changes during the stage of puberty and later adolescence, which go on within the limits of sanity. This age has often been characterized as that of mental and moral inebriation and of psychic madness, and from my studies of its phenomena I am convinced that nearly all of its symptoms can be paralleled in the inner and outer life of youth who do not lapse toward the terminal imbecility, but develop to sane and efficient maturity. Here we may demand that the normal psychologist shall help to contribute a sound basis to the study of disease, while the alienist, who deals only with salient, flagrant, or ostensive instances where natural tendencies are 'writ large,' and who does not know the genetic and natural history of the soul, cannot solve the most fascinating problems presented by clinical pictures."

Whether we can follow Hall to the full limit of his suggestions is doubtful; nevertheless the thought that he has so well amplified from the writings of others and so well summarized is deserving of the most careful attention.

The suggestions of Bleuler, Meyer, and others, that in these trying years of change many fall by the wayside for lack of a proper adjustment to the reactions of everyday life, offers a most fruitful key to the answer of our problem. The work of Hall and his students, of Marro, of Spitzner, of Ludwig v. Strümpell, and of Heller, not to mention a long list of previous and contemporary workers, has served to bring into prominence the altered states of mind in this restless period of development, and in the fruitful phrase of Meyer, "habit psychosis," there is more than a mere suggestion.

Puberty is the time of sudden expansion of personality and individuality. The boy or girl commences "to feel his oats," and parental counsel, especially if unwisely urged, is scorned and spurned. The individuality commences to assert itself, and in our modern times, and among urban youths, ideas of fortune and renown commence to fill the mind. Coe has called attention to the acute exacerbation of the feeling of self-consciousness of this period as well. He shows that reflectiveness often leads to self-criticism that may become morbid. "Anxiety to do right exhausts the energy that should go to action, trifles are augmented to mountains, or debate with one's self as to what is right is carried so far as to paralyze decision." This increased introspection and heightened period of self-consciousness is invariably attended by ideas of being under observation, and furtiveness and oversuspiciousness is a trait that may become fixed unless corrected in a wise manner. To draw within one's self is with some the very opposite tendency to those bolder self-assertive souls, yet

with both, dreams morbid and moody, or castle-building, are characteristic of the period. Thoughts of overesteem, overconfidence in one's ability, here may lay the foundations in the adolescent for ideas of superiority and even insane conceits.

Imagination may know no bounds. At puberty this inner mental fire seems to be kindled into the most exuberant and least restrained forms. Illusions are many and varied, and often their making becomes so habitual a pleasure-giving device as to resist subsequent uprootal when the youth is brought face to face with life as it exists for everyday purposes. This is the time when all of the senses feel the touch of poetic flight, and sound and color pictures fill the minds of many. Hall writes that now "thought and the two higher senses (sight and hearing) are never so vivid and intense, for they are just ready to bifurcate, each to lead its own life, so that the two are now peculiarly liable to be confused, intellectual processes to take sense forms, and vice versa. It is for this reason that hallucinations, false sight, and especially hearing, are most common; but in brains tainted by morbidity the faculty of discriminating mental from sense forms is undeveloped, and dreamy conditions may become habitual, so that we see here the natural budding of insane perceptions."

Consecutive speech in the form of conversation, particularly with strangers, is at this time being demanded of the adolescent. New school associates commence to widen the horizon, and when we would analyze a conglomerate of many individuals we perceive spreading out from the mean, comparatively small numbers, the divergent tendencies, either of excessive speech tendencies or reticence, both of which if uncorrected by the tendency of habit become stereotyped, and if the element of intellectual deterioration be added very significant symptoms, known to psychiatrists, stand out in bold relief. In many individuals at puberty we find a very marked tendency to catch at phrases which sound well, and the youthful mind in its imitative manner grasps expressions from many sources and packs them in the memory for the appropriate time to come, when they may be used to the best advantage. All are acquainted with the youthful types which use such grand, undigested phrases, sometimes to great advantage. They are often thought positively brilliant by admiring parents. With increasing mental power these exuberant growths become more moderate, or the general rise in the whole intellectual level makes what at one time were islands of extravagant thought and expression a part of the picture of more mature power, coördinated and regulated to the needs of speech, spoken or written. The psychiatrist is also only too aware of the significance of this symptom when it persists, either by reason—which one cannot decide on a priori grounds—of a loss of that rise in general mental power, or because of a marked "neural trend" on an exaggerated habitual exercise accompanied by a "reaction hypertrophy," if I may so characterize it, of this character. These patients show the peculiar affected speech,

filled out with large-sounding phrases and words clearly out of their normal perspective (neologisms.) The more complex state of Forel's "word salad" defies analysis from this simple standpoint.

Inasmuch as youth has not gathered enough facts of life on which to base wide judgments, it is very natural that at this period, when some reaction is necessary, we should find a sudden blossoming out of the imitative faculty. This in the motor sphere shows itself very distinctly in mannerisms, modes of walking, etc. One can almost picture the youths of a definite college group by their swing and their swagger; their imitations, further, conscious or unconscious, of modes of dress, of brushing the hair, choice of neckties, etc., etc. In a small number one sees these reactions become stereotyped—as it has been well expressed, "just as speech may lose its highest function and lapse to not only slang, but even interjectional forms, so poses may slowly become fixed postures and even contractures, or a limited repertory of stereotyped acts may develop on a basis of the natural automatisms of Lindley."[7] Whether one is justified in reading into those individuals at the other extreme speech negativism as an exaggerated habit reaction, independent of the processes of deterioration, or of reaction to delusional thoughts, is still an open question; yet the general process of negativism so characteristic not only in adaptation of the muscles of speech, but in all motor reactions, will undoubtedly have much light thrown upon it if closer observations can be made of the pre-dementia peculiarities of these queer personalities with which we are all familiar.

That this question is not incapable of analysis Bleuler's[8] recent contribution to the subject of negativism will amply indicate. He discusses the simple mechanisms of the body, showing that throughout opposing forces are at work. In the muscles agonist and antagonist oppose one another and determine correct functioning. In the nervous system stimulant and depressant mechanisms modify the exchange of heat, the movements of the intestines, the dilatation and the contraction of the bloodvessels, and the sphincteric controls. Everything in life is conditioned by a play of opposing forces, of opposing ideas, of opposing effects. Conflicting emotions are aroused simultaneously, and there seems to be a definite mechanism at work. The child who hangs back on being offered a piece of candy illustrates this play of forces, and the control of the sexual impulse in prudery by rejection is almost universal. Vacillation is the rule, and the mechanisms are useful ones to prevent disaster from undue hasty action, quite comparable to the "synaptic phase" of the reflex arc which is conservative of too rapid passive extension of muscles. Many individuals in spite of marked intelligence cannot call up any opposing ideas because of the force of the impulses pushing to action,

[7] Some Mental Automatisms, Ped. Sem., July, 1897, p. 41–60

[8] Die negativ Suggestibilität, ein physiologisches Prototyp der Negativismus, der conträren Autosuggesstion, und gewisses Zwangsideen, Psy.-neur. Woch., 1904, Nr. 27, p. 249.

while others are unable to decide among the many contradictory impulses; they are light-headed and hypervacillating because of the the lack of definite impulses. The crying in joy and the laughter in sorrow, so commonly seen in hysterical subjects, for example, are illustrations of this loss of capacity of regulation.

When the mechanism of opposition becomes too pronounced, becomes quantitatively stronger in function, negativism results. In physiological conditions one sees the contrary idea enter into active appearance as a form of negativism or as a suspicion often in combination with a distinct weakness of reflection. Children, many women, old women, show this form of physiological negativism. From the standpoint of teleology one can regard the early appearance of the contrary idea as a form of protection against being taken by surprise. The one who never permits its influence in daily affairs is our friend, Mr. Easy Mark. His contrast is seen in the confirmed pessimist, also a newspaper acquaintance, this time "from Missouri." Suggestibility and negativism, then, are to be regarded as different sides of a fundamental quality of the psyche which spring from a common source.

Jung and Ricklin have shown, in their studies on dementia præcox, that many of the most striking symptoms are only qualitatively or quantitatively distorted mechanisms of the normal soul life. This is very characteristically true of this symptom of negativism, of which there is unquestionably more than one kind. In dementia præcox, as I understand Bleuler, the primary idea, which may give rise to its normal opposing idea, is present, as in the normal mechanism; the play of different motives (deliberation) being retarded, only the primary and its contrasting impulse remain. Interference or retardation occurring in the primary impulse, an abnormal activation of the contrary impulse results, deliberation becomes impossible, and negativism, impulsive ideas, or obsessions prevail. There exists, then, not only a positive suggestion, that is, a tendency to accept the called-up ideas and feelings from the outside, but also an analogous negative suggestion, that is, a tendency to decline. This is normally one of the most important moments for the forcing of a deliberation to action. On the pathological side it leads to negativism, to contrary autosuggestion, and to a definite class of compulsory ideas.

The distractibility of youth is marked; especially is this marked in certain individuals. It is difficult for the child to keep its attention centred on one line of thought or action. With keen sense perceptions the child is open-eyed and open-eared to all the world. Not all children, however, by any manner of means. The impulses that determine a definite and adequate interest are often lacking in early life, and develop only with the onset of puberty and adolescence into any formal system. Here again the variation in child life in the matter of attention will repay careful analysis. Our statistics regarding the reaction types of attention in those who have gone to an early decay

are not yet gathered, and definite criteria are lacking. That marked attention disorders are significant in dementia præcox is a commonplace. Distractibility is very common at times, although rarely exhibiting itself in the same manner as with the manic-depressive. The inability to concentrate on any one point, whether as significant of extraordinary fatigability or as indicative of the perpetuation of an adolescent reaction, cannot be as yet postulated. In view of the marked lack of interest that influences the process of attention, it seems not improbable that some other approach to an understanding of this attitude is needed.[9]

Looking back over a series of years and reviewing the early histories of a comparatively large number of patients whom I have known fairly intimately, both in their home life, their school, their college, work, etc., my own observation has led me to register a mental note that most of the precocious dements with the paranoid tinge have occurred in those whom I have known to be singularly lacking in the divertibility of the attention, particularly for objects of auditory and optic sense. These young people I have known have all been very poorly gifted in the power of external observation. They, as young men and young women, never saw anything in the ordinary sense of seeing. Their lights were all turned within, and while all were singularly gifted their gifts were made manifest in matters of literary or artistic constructive qualities, using the products of introspection rather than in the direction of their being natural science workers. This observation is in need of careful scrutiny, and is of the broadest character and is recorded simply as such.

The story of the emotional life of the adolescent is an unwritten book, so many are the intricate shades in various individuals; but in all youth there is a markedly increased emotional tone given to all the spheres of activity. With increasing powers of self-control the emotional reactions become less violent for the many, but here it is an observation of old, that intellectual training has little influence on the emotional life of an individual. They seem to be lower arc reflexes. The subtle series of reactions, whatever they be, that constitute the emotions are in a most peculiar sense individualistic, and one of the most primary qualities of personality.

The variabilities in the matter of the emotional life have not been overlooked. Studies from the anthropological side—of primitive man, even of animals—as in Darwin's well-known study of the emotions in man and the lower animals; Hughes, Mimik, De Sanctis, and others show that in this general psychological category we must look for the greatest amount of variability. Child study has emphasized how widely the children in a single family may vary in this as in other important aspects; hence it is not at all surprising to find one boy of seventeen often a comparatively unemotional per-

[9] Compare Madeleine Pelletier, L'association des ideés dans la manie aigue et dans la debilité mentale, Paris, 1903.

sonality from lack of an excitable emotional mechanism, while another with a much more variable instrument has learned to control, and still a third goes into adult life before control is gained, and an "hysterical tendency" finally eliminated by wise counsel, or by "experience" with the world. The various difficulties attendant on the study of our emotional nature, which Hall[10] infers is unfortunately too much taken up in the study of books by our regular psychologists, is widely appreciated.

Emotional stability undoubtedly can be acquired by proper training, and it is one of the great services of Dubois, of Bern, that he has formulated some of the fundamental notions whereby control of an unstable emotional organism can be acquired.

What Kraepelin considers as a fundamental sign of dementia præcox, "emotional dementia;" that which Stransky[11] has laid so much stress upon, namely, the great disproportion between emotional reaction and ideation, his dissociation of Thymopsyche and Noopsyche, what has been termed intrapsychic ataxia; or what Meyer has expressed[12] as "discrepancies between the mood and the reaction," is of special interest in this comparison of the not unusual reaction type of the mentally healthy and the mentally ill adolescent. In its relation to the emotional states of many hysterical personalities are offered some deep-seated analogies that should not be overlooked. If I might express it crudely, in dementia præcox we find a stage of emotional impoverishment due to the breaking down, perhaps as Freud terms it, a process of conversion,[13] of a rich plexus of associations of many years' growth—the changes in the affective life should be interpreted from the standpoint of a disintegration or analysis of what had heretofore been a developing and fairly fixed personality. On the other hand, in the emotional status of the hysterical I believe we have the raw material of emotional reaction unchecked and poor in associative control, not from a breaking down of connections previously made, but from a deficiency, or retardation, in development of these. To characterize the former as Kraepelin does, as an "emotional dementia" suggests the term "emotional backwardness," as a prototype of the other, and just as in organic nature very closely related products may be formed, the one by analytic or destructive processes, others by synthetic or constructive stages, so in the emotional sphere the symptoms of many individuals suffering from dementia præcox come to resemble those of patients with hysteria. That very difficult point of doubt where it is impossible to determine whether one has to deal with a simple cessation or a mild retrogression of function may some day be solved through a study of the adolescent

[10] Adolescence, vol. ii, p. 59.

[11] Zur Kentniss gewisser erworbener Blodsinnformen. Jahrb. f. Psyc. u. Neur. 24, 1903, p. 1.

[12] Fundamental Conception of Dementia Præcox, Brit. Med. Jour., September 29, 1906.

[13] Ueber die psychischen Mechanismus hysterischer Phänomene, Neur. Ctblt., 1893, Nos. 1, 2, and later contributions.

emotional life and a study of the hysterical personality. The hysterical side of the problem is being approached by Breur and Freud from a study of the subconscious, by Ricklin and Jung in their association investigations, by Janet and Babinski and many others, and it seems not unlikely that, by a comparison of the broken-down personalities of the dementia præcox with the unknit and unstable personalities of the hysterical, light of lasting value will come into the problem. Just as Kraepelin came to such a heuristic idea of the general conception of dementia præcox by a study of the end stages—that great mass of secondary dements that seemed to contain so little hope of revealing any important principles of mental processes—so will that infinitely more hopeful study of personality in the formative periods of life afford measures by which the conception now gained may be amplified and clarified.

In this hasty review the attempt has been made to bring to mind those normal adolescent features which by their "exaggerated development" or their "persistence" into adult life serve so to modify the personality of the individual as to give it an abnormal stamp—a stamp which has its alliances to many of the features which are recognized and grouped as dementia præcox, particularly as seen in hebephrenic and paranoid states.

In thus calling attention to these resemblances the important causes for the "exaggerated development" or for the "persistence" of these adolescent traits should not be lost sight of, and if the picture is to be rounded out in this respect one must not neglect to make an inquiry as to any antecedent factors which might have an influence, although it must be confessed that what is known is very meager and far from satisfactory.

Darcarren[14] has used the phrase "a characteristic prenatal tire" as being applicable to the precocious dement, summarizing, as it were, two at least of the most important subjects of inquiry, hereditary and fatigue influences.

Heredity is a vague term, and is used by us all in a very loose manner, notwithstanding the many pitfalls that have been pointed out by Weismann and the studies of special interest of Brown-Séquard, of Luciani, and of Fere.[15] Yet it is one of the most striking in the present connection, for among the psychoses dementia præcox shows abnormal antecedents in a disproportionately large number of instances, even exceeding the proportions of manic-depressive insanity according to some observers. Magnan speaks of the accumulation of hereditary influences in the ancestry[16] and makes a general series of categories for the "constitutional psychoses," as the French class them. Indeed, most modern French writers speak much of

[14] Thèse de Paris, 1902.

[15] Comptes-rend. Soc. de biol., March, 1882. Arch. Ital. d. mal Nervosi, 1881. Soc. de biol., 1894 et seq.

[16] Congres internat. de méd., 1890.

degeneration and heredity, but offer general remarks rather than actual facts. His paranoias are always (96 per cent.) tainted. Torrini's[17] phrase is that the psychoneuroses of the ascendants prepare the soil of the paranoid constitution of the descendants, and the term of his transition is his secondary paranoia. Tanzi and Riva[18] lay much stress on atavistic tendencies, thus still further introducing confusion into what is already very dark. One needs but to read the chapter of Anglade on the influences of heredity in Ballet's recent *Traité de pathologie mentale* to see how far from being coördinated are the recent French works at least. Gauthier[19] is one of the few of the French writers since Morel to give accurate data in this respect. He lays much stress on the hereditary factor in the causation of juvenile breakdown, and gives the histories of some 13 patients, all suffering from some one of the varieties of dementia præcox. Of these practically all show most marked hereditary ancestry; furthermore, in his cases at least 75 per cent. showed marked physical stigmas, usually multiple in character, cranial malformations, variations in eye-muscle balance (strabismus) being particularly common. In addition it was noteworthy that the patients for the most part suffered neuropathic accidents while young, particularly convulsions of a recurrent type. Indeed, the occurrence of motor anomalies is very characteristic in these patients, and is often foreshadowed while very young.

Ancient psychiaters were so impressed by this truth and made it such a commonplace that careful statistical studies have been neglected. Esquirol spoke of an adolescent insanity as characteristic in hereditarily implicated parents; Morel also spoke of the outbreak of insanity at the adolescent period as the revelation of the degenerate taint.

German students have contributed widely to the subject of the influence of heredity in dementia præcox. Kraepelin is among those who lay much stress on this factor. He says that at least 70 per cent. of the patients with dementia præcox show a definite hereditary taint, and in at least 17 to 18 per cent. the immediate ancestry, paternal or maternal, is involved. Illberg in his monograph finds, on the one hand, a much lower percentage, 45 per cent. of near and remote ancestry influences, in 20 cases subjected to searching analysis, while, on the other hand, in a higher percentage than Kraepelin's, 30 per cent., the influence was direct. Among English students Clouston[20] is most emphatic when he says: "The insanity of puberty is always a strongly hereditary insanity; it, in fact, never occurs except where there is a family tendency toward mental defect or toward some other of the neuroses." Clouston also calls attention to what he terms

[17] La paranoia secondaria, Revista Sperimentale di Freniatria 1889, vol. xiii, p. 52.
[18] Riv. Sper. di Fren., 1886 vol. xii.
[19] De la démence precoce chez les jeunes aliénés héréditaries, Thèse de Paris, 1883.
[20] Sixth edition, p. 582.

unphysiological methods of education as an important factor in the causing of these early insanities. "There is no time nor place of organic repentance provided by nature for some of the sins of the schoolmaster."

Numerous other studies might be quoted on this point, but the general concensus seems to show that heredity is an element of great importance in the breakdown of these adolescents.

What kind of hereditary influences are most to be feared, or, rather, are certain taints in an ancestry more likely to lead to dementia præcox rather than to other forms of mental disease? We are not yet in a position to state this with definiteness.

Mendel repeats in his text-book what has often been said, that similar types of insanity are more apt to be transmitted to the children, and in the light of the present time groupings, numerous studies tend to accentuate this general viewpoint. Thus, Strohmayer says[21] with a certain degree of positiveness, that it is characteristic that the same type of psychoses appears in family after family—the severe hysterias, paranoia, hebephrenia, periodic and circular psychoses, and imbecillity.

Krauss,[22] working with the material of the Heidelberg Clinic, states that he has found as high as 93 per cent. of similar heredity in dementia præcox in ascendants and descendants, but his figures are drawn from but comparatively few instances, 13 cases of dementia præcox in the ascendants showing 14 descendants with dementia præcox and 1 with manic-depressive insanity. In a group of 7 ascendants with manic-depressive insanity 11 descendants were affected with the same type of disease, 4 with dementia præcox. Krauss' table IV, showing dementia præcox in more than one member of the family, is particularly instructive.

Kalmus[23] points out that, in his studies of the Lübeck Institute, in the majority of cases of dementia præcox hereditary factors on both sides were present.

Pickett's[24] analysis of 58 cases of well-marked dementia præcox is of interest. He divides them into the classical groups: 30 of hebephrenic, 11 of katatonic, and 17 paranoid forms. In his 30 hebephrenics, direct mental heredity, including alcoholism, is shown in 17, over 50 per cent. Insanity occurred in the parents of 7, nervous disease (not stated) in 3, apoplexy in 2, and alcoholism in 5. Tuberculosis and pneumonia are listed, but the connection is too remote for our present purposes. In his 11 katatonics direct heredity is present in 6, insanity in father or mother being present in 3 and in 1 sister. In his paranoids the proportion is 10 in 17, direct insanity in the parents showing in 4. His figures are quite comparable to those

[21] Allg. Zeitschr. f. Psychiatrie, 1904, 61, p. 365.
[22] Ibid., 1903, 60, p. 224.
[23] Ibid., 1905, 62, p. 230.
[24] Journal of Nervous and Mental Disease, 1904.

of Kraepelin and others, although not supporting very strongly (indeed such a small number would hardly admit of searching comparisons) the view that the paranoid types show the highest percentage of hereditary taint. The type of insanity in the parents is unfortunately not given. In fact, such figures are difficult to obtain, notwithstanding their value and the comparative uselessness of those that are here given. Apart from Toninni's quoted statement that the psychoneuroses of the ascendants tend to appear as paranoia in the descendants, we are lacking light in this direction.

Vorster[25] has made specific inquiries in regard to both dementia præcox and manic-depressive insanity, and has presented an able summary of the work of his predecessors, to which reference may be made for the best survey of recent German literature.

Vorster has also made an attempt at a more definite classification of the insanities under discussion, and has given us perhaps the most satisfactory piece of work for our present purposes. He controverts the idea so wide-spread in previous times that the insanities of hereditary transmission are polymorphic in type, and arranges himself with those who see a likeness in the form of mental disease of the parent and the child. Only the recent groupings of Kraepelin could render his conclusions so valuable. He presents the histories of 23 families, in 9 with manic-depressive disease, in 8 dementia præcox, in 6 a psychosis of later life. In his 9 manic-depressive ascendants he finds 80 per cent. manic-depressives in the descendants, while in none of his families with manic-depressive ascendants were either dementia præcox or paranoid states found in the descendants. (Vorster has found 36 per cent. heredity of dementia præcox in 1000 cases.)

While most authors who have studied the question of heredity in mental diseases have stated that manic-depressive insanity shows the highest percentage of hereditary influences (Morel,[26] Kraepelin,[27] Sioli,[28] Fitscher,[29] etc.) it should not be forgotten that the precocious dement rarely has the opportunity to become an ancestor. On this account the problem in this disease acquires special interest, and special light is desirable to prejudge the influence of this factor. Vorster's study shows that all of the families with dementia præcox in the ascendants showed dementia præcox in the descendants, and that moreover in his cases there were more instances of inbreeding (the marriage of cousins) resulting in many more cases of dementia præcox than of manic-depressive insanity. Certain of Vorster's findings are of particular interest, showing that while the same general disease group was transmitted, it may appear in a different form. Thus in his family 1, in addition to the katatonic symptoms which were present in the twenty-nine-year-old mother and two sons,

[25] Ueber die Vererbung endogener Psychosen in Beziehung zur Classification, Monatschrift f. Psych. und Neurol., 1901, ix, p. 161.

[26] Traité des maladies mentales, 1860. [27] Lehrbuch, loc. cit.

[28] Arch. f. Psych, 16. [29] Monatschrift f. Psych. u. Neur., 1900, 7, p. 127

there was also a marked paranoid state in one of the sons. In family 2, a paranoid state was characteristic in the twenty-four-year-old mother (a cousin), while simple hebephrenoid dementia was present in both daughters. In family 3 mother and son showed marked impulsive stereotypy which in the mother was manifest in her "haltung," while in the son it appeared in his movements. In family 4 the excitement stages in the mother were of the anxious depressed type; in the daughter they were more katatonic in their general character; In family 7 paranoid states were present more in the descendants. while in family 8 it showed in the ascendants.

In 6 families showing senile dementia in the ascendants, in 5 descendants dementia præcox appeared. Idiocy was a result in the sixth. Further he shows that in 29 cases of dementia præcox occurring in brothers and sisters, 26 showed a similar inheritance in the parent, and 3 a dissimilar. The similar inheritance was manifest in 22 families with dementia præcox and 4 families with manic-depressive insanity.

Sioli's[30] excellent though now somewhat outdated study points in much the same direction. In his family 5, Schumann, it would appear that one of the descendants suffered from katatonia, another from manic-depressive insanity, while the ascendant had a manic-depressive psychosis. In family 6 a dementia præcox followed an alocholic insanity. Family 7 shows a probable dementia præcox following an uncertain psychosis. Family 11 shows well-marked dementia præcox in ascendant and descendant, family 14 and 15 the same picture.

In some particulars the hereditary element in the katatonic alliance seems to show a variation. It is of particular interest to note that the founder of the group of katatonics, Kahlbaum[31] says, p. 54, that heredity plays little part in the causation of katatonia, and in his 50 cases in only 4 was a definite history obtainable, while in all of the other cases no mention was made of it, and in the greater part of these it could be definitely excluded. Pronounced characters were, however, found in a greater number of instances—as high as 11 in the series of 50 cases. Other studies on katatonia and heredity are not accessible. While our present interpretation of the katatonic syndrome has undergone some modifications, it seems that of all the presently recognized approximations, katatonia differs in this important respect.

My own observations on cases of well-developed dementia præcox which I have been able to follow for many years and whose parents have been well known to me, has shown that three elements have been most emphatic in the ancestry: dementia præcox itself, alcohol, and abnormal personality or crankiness, if I may so express it. Alcoholic

[30] Ueber directe Vererbung von Geisteskrankheiten, Arch. f. Psychiatrie, 1885, xvi, 113.
[31] Die Katatonie, oder das Spannungsirresein, 1874.

parents have, in my experience, been most responsible for the hebephrenics; in many instances the alcoholism has been a symptom of profound neurasthenia or even a dementia præcox at a more advanced age, to which it in turn has contributed, and established a vicious circle which has left its impress in heredity. Pathological characters have constituted another most striking feature in my series of cases. These have been psychoneurotics in verity, and in this respect I agree with Tonnini—since these people may well be termed cranks. Marital incompatibility, due to the inability of one or both parents to adapt themselves to common-sense relations, has been a significant factor in many of the paranoid dements that I have been able to know well in the pre-dementia stages. This has had a marked influence on the education as well—which point properly belongs to the subject of our inquiry. One other class may be termed the "derelicts"—themselves in all probability suffering in some slight degree from dementia præcox coming on later in life. Many of these group themselves in the alcoholic class, since with the advent of manhood they sink back in the struggle for subsistence and are unable to compass more than small clerical positions. Many of these are the semi-failures of life—those pushed aside in the struggle, and forced to be content with small returns. This class has contributed the greater number of all classes of precocious dements to the population in my experience.

As to the influence of inbreeding, experience has shown that it all depends on those that breed. If neuropathic trends are present in those of blood relationship it is much more likely than not that the children will suffer. Healthy stock intermarrying often shows excellent progeny. Woods[32] shows that the usually accepted beliefs regarding royal intermarriage are in need of more explicit statement, and as now stated are more usually false than true. Thus it seems from his analysis that close inbreeding of the Hohenzollerns produced no bad effects until insanity was directly introduced into the stock, when the evil results began to appear in Isabella, Queen of John of Castile, and later inbreeding caused great havoc with the stock. The effects of insane stock appear very strongly in the Hapsburgs. The general influences drawn, however, accentuate the first statement of the position that inbreeding is bad only when the characters bred are in themselves distinctly pathological.

When, however, the pathological commences to heap up as has been noticed in the Hapsburgs,[33] then a distinctly degenerative stock results, and inferences regarding the probable outcome in such families have almost the value of prophetic insight. In many marriages one may say that adolescent breakdown in the progeny is foreordained.

[32] Heredity in Royalty.

[33] Kekulé v. Stradonitz, Ueber die Untersuchung von Vererbungsfragen und die Degeneration der Spanischen Habsburger, Arch. f. Psychiatrie, 35.

Peipers,[34] who has contributed one of the most thorough of recent studies on this subject, believes that we are not yet in a position to draw any positive conclusions. His position seems to favor the belief that the marriage of blood relations is not attended with the serious results that have been laid down.

What is needed in the analysis of heredity is more than we have been in the habit of recording. We have been too much concerned with spinal-cord disease, apoplexies, etc., as hereditary factors, when they often may have no relationship whatever to the psychoses in question and might be neglected in our judgment of hereditary factors. A closer and more detailed account of the special personality of the ancestry is of more value than the vague terms, family neuropathic, mother, father, or grandparents insane.[35]

It seems almost futile to assert that insanity is not an entity. Everyone knows it, yet the phrase is continually in use as though it represented a stable entity; we have rather a host of shifting conditions, and our mental histories will be all the more valuable if more specific descriptions and fewer generalizations are recorded.

Alcoholism, vagabondage, ungovernable tempers, peculiar characteristics, great emotionalism, often seen in exhorters, etc.,[36] tendencies to antisocial conduct, to suicide, to thieving, to deceit, etc., these are all in need of recording, without undue emphasis, however, if a better history of heredity is to be written.[37] [38] Even then evidence is not lacking that in many directions we are building on shifting sands,[39] especially when we read in the paper of Jenny Koller[40] that the healthy-minded people show mental heredity in 59 per cent. of the population investigated.

Do the so-called physical stigmas assist us in forecasting a possible adolescent breakdown of the type here discussed? Purely in a most general way. While there is no doubt that one will find among our institutions a greater proportion of such stigmas, correlations needful for our present inquiry are not yet available. The modified psychiatric teachings will perforce render the older teachings only partly applicable.

A second factor that remains to be examined is that of tire, or fatigue. It would be unnatural to find a concordance of opinion with reference to the influence of fatigue on the nervous system of adolescents. The vehemence and almost violence, one might say, of those who advocate reduced educational schedules on the ground of their

[34] Consanguinität in der Ehe und deren Folgen für die Descendenz, Allg. Zeitschr. f. Psychiatrie, 58, 1901, p. 793.

[35] Diem, Arch. f. Rassen und Gesellschaftsbiologie, 1905, Heft 182.

[36] Näcke, Allg. Zeitschrift f. Psychiatrie, 63, 1906, Heft 3, 4.

[37] Strohmayer, Ziele und Wege der Erblichkeitsforschung in der Neuro- und Psychopathologie, Allg. Zeitschr. f. Psychiatrie, 61, 1904 p. 355.

[38] Individuelle Geistesartung und Geistesstörungen, Th. Tiling. Grenzfragen des Nerven und Seelenlebens 1904, No. 27.

[39] Lorenz, Lehrbuch der Gesammten wissenschaftlichen Genealogie, 1898.

[40] Arch. f. Psychiatrie, vol. xxviii.

inducing excessive fatigue in children and young adults, with consequent nervous and mental reactions, has its counterpart in the extreme position of the skeptics who claim never to have seen any results of intellectual fatigue. It is more than probable that the natural adjustments of the normally formed adolescent to the influences of fatigue (laziness, distraction, etc.) will prove sufficiently protective, yet for the adolescent with some of the hereditary factors already outlined it is a fact the significance of which cannot be controverted that fatigue is a highly important element in their mental breakdown. So that while some may fail to be impressed by some of the many carefully conducted psychological studies into the influences of fatigue, these studies nevertheless show in a graphic manner that which clinical experience has amply demonstrated. School work is not the only cause of fatigue by any means, but it plays a rôle in the genesis of the neurasthenoid background which is so prominent a feature in many of the pre-dementia præcox signs, and one cannot fail to be impressed by the unnatural fatigability of these individuals.

Such good observers as Emminghaus, Ziehen, Eulenberg, Pick, L. Strümpell, Kahlbaum, Hecker, Christian, Wille, Uffelmann, Binswanger, Baginsky, not to mention scores of others of equal prominence, all describe well-marked neurasthenic developments in the child and young adult, and ascribe them to the overburdening of school life. Among the ancients Willis says, in his striking way, that which I have quoted in my introduction to this paper. Kahlbaum, in his celebrated monograph, writes that he has been struck with the fact that so many teachers, sons of teachers, theological scholars, have been affected by the katatonic process. He believes that intellectual strain is one of the foremost of the contributory causes to this type of breakdown, the sexual life also aiding.

Intellectual overstrain is considered by him as of very practical importance, so much so that he says (p. 56): "Dass es, 'die intellectuelle Anstrengung' vorzugsweise die Ueberanstrengung beim Lernen ist, welche die Katatonie eigenthümlich ist."

Illberg, in a recent monograph, says that the great majority of his patients were hard-working and industrious. One-half were well endowed; the others less so. In those of less marked ability a protracted mental overstraining in the years of development is not without etiological significance. Hecker had called particular attention to the backward ones who were unable to keep up in their development, and Heller[41] has dwelt particularly on the psychoses of these inferiors. But the more striking instances are those who have been precocious, and attention should be carefully focussed on the precocious children, a great many of whom have suffered from dementia præcox. Baur[42] goes so far as to say that all mentally precocious

[41] Ueberburdungspsychosen bei minderwertigen Kindern, Zeitschrift f. Schulgesundheitspflege, 19, 1905, p. 649.

[42] Zeitsch. f. Schulgesundheitspflege.

children, so called in ordinary life, are pathological, and he believes them mentally ill, and are called on too early to endure great fatigue. These irritable, weak, wonder children are a veritable fata morgana, and are too often called upon to exhibit their striking qualities. If such children are not to be offered up to the altar of their parents' pride, they must be denied routine school exercises and be carefully taken care of rather in the playground. To stimulate such children to wonder-working stunts for proud aunties is to pour oil on the fire and hasten their breakdown. "Many of these wonder children are often only straw fires—they burn brightly and fiercely for a time and then all is over."

The symptoms that develop in these children as a result of overwork plus other factors concerning which we are unable accurately to estimate are very striking. Certain forms of excitability and restlessness should be distinguished from the ordinary restlessness and general tire states that are normal in all adolescent school-rooms. The pathological tire is one that does not recover as a result of the usual resting period, and these children are often the very ones that do not get the resting period because of a certain intensity of their application to their work or to reading.[43] The adept teacher recognizes the period of oncoming fatigue by the marked increase in mistakes and the flagging attention. School anxiety, particularly in starting new work, is to be carefully studied, either as a sign of fatigue or as a physiological negativism to which fatigue has given birth as its corrective. Changes in the mood are of much moment. Sudden rudeness, excessive selfishness, irritability and peevishness, lowery and quarrelsome, these often indicate more than the normal amount of fatigue, and are often the precursors of frank mental tire.[44]

Prominent among the more intellectual process disturbances, particularly in the neurasthenoid states, are memory defects, both for objects of sense as well as abstract concepts, although the more complex memory pictures seem to be more hazy. There is slowing of the mental processes and a subjective mixed sense of inability to get to work. The attention wanders, and the adolescent finds it difficult to control the day dreaming. He becomes lonelier in his disposition, refuses companions, and takes long walks. Occasionally one finds these hard-working students walking in their sleep, and not infrequently they go about in the night hastily attired or even not dressed at all. Frequently one finds great anxiety on the part of the person himself not to be left alone at night lest he will do some such foolish thing. Out-and-out neurasthenic symptoms are by no means infreuent in many young adults as a result of their school work.[45]

[43] Spitsner, Anzeichen beginnender Nervosität, Zeitschrift f. Schulgesundheitspflege, 16, 1903, p. 395.

[44] Hintz, Geistesstörungen unter den Schulkindern, Zeitschrift f. Schulgesundheitspflege 1899, p. 179.

[45] Emminghaus, Die psychischen Storüngen des Kindesalters, 1887.

What constitutes this mental surrmenage does not permit of clear-cut definition. It shows more in its results than in the making, and the integer of most importance and least conspicuousness is that subtle constitutional background. The amount of mental work seems to play less role than the method of its acquirement. Children well trained from infancy seem to stand increasing strains without serious embarrassment, while those who have had little or no training and are suddenly called on for prolonged cerebral work show tendency to break down out of proportion to what might be expected.[46] Christian and others in France have made the observation that when an ill-directed ambition has stimulated children of psychically poor rural stock to take up intellectual pursuits in the urban centres, dementia præcox is not an infrequent result.

Whether we can make any comparisons that are valid with reference to the differences of surrmenage in urban and rural communities is open, in view of the enormous complexity of our social conditions, particularly the incessant fluctuation and going here and there in our cities. Gaupp,[47] who has given one of the few studies in this connection that merit serious consideration, says that one very characteristic difference between the receptions of a rural clinic (Heidelberg) and a city clinic (Munich) is the greater number of young patients received in the latter; possibly indicating one important fact at least, that of the greater mental strain in the city environments. As to the matter of the group dementia præcox itself, seen in all its forms, he says that they seem to be present in about the same number in both places, but that the city shows a great many more young cases, particularly those with marked katatonic excitement with relatively good prognosis, that is, as far as the individual attack is concerned—a fact corroborated by Dr. Gregory in his experience at Bellevue—and many more of the more prolonged paranoid dementias or perhaps Magnan's chronic systematized deliria, particularly in the female sex. Thus Gaupp's study would point in the same direction that the increased tensions of city life have an important bearing on the development of dementia præcox, and these tensions all involve greater mental competitive functioning which lead to neurasthenoid states. There is a great need for rest cures for large numbers of tired teachers which can be run on an economical basis, and for the "rest" places which Sommer has been pleading for for years in connection with our museums, galleries, etc. The fact that the needs for this class of "erholung" have been expressed by all speaks for a tacit agreement that mental fatigue is many sided—it does not always mean books,—and that any measures taken to minimize its effects will result in healthier mental activities.

This portion of the theme might be expanded, but the recognition

[46] Wille, Die Psychosen des Pubertsalters, 1902.

[47] Die klinischen Besonderheiten der Seelestorüngen unserer Grosstadtbevolkerung, Münch. med. Woch., 1906, June 26, July 3, pp. 1250, 1310.

of the influence of fatigue in bringing about lessened mental functioning is almost a common-place. The aspect of the question of most practical interest at the present time is for greater clarity of view as to the more essential phenomena of fatigue and their earlier recognition, and differentiation of the more and less important of these signs and their more definite connection with personality and its balances. The highly artistic symphonic concert that leaves one adolescent almost a wreck from overstimulation may put asleep another of different reaction tendencies, and the recognition that there is a necessity for the clearer insight into what may bring about fatigue in the specific individual is imperative if an enlightened prophylaxis is to be taught and brought from hazy generalities to clarified, even if partially inadequate formulæ.

Other occasional causes are many, but I have chosen to regard their discussion as being premature at this time. This pertains particularly to masturbation, concerning which much might be said, pro and con. The transcending influences of the sexual life are recognized by all. Masturbation is but one symptom (a sexual catharsis) in this large function, and the study of the cryptogamic development of sexual ideas, brought into scientific sanction by the methods of Breuer and Freud, Jung and Ricklin, Janet, and others, cannot fail to impress the student that what is so important as a disaggregating emotional influence in hysteria must play no small role in fatigue and even in the dissolution of dementia præcox. But for the present I prefer to neglect this factor, recognizing that a middle ground must be taken. It is the tendency for neurologists to look upon onanism as a result, rather than as a cause. To me it is far from being clear that it is not both in many instances.

Prophylaxis. The trend of the point of view adopted leads to the assumption that an enlightened pedagogy can be of more than casual service in the prevention of mental breakdown. This belief is, I believe, abundantly well warranted. But its recognition also implies a restricted application. It were folly to believe in this century or in the next to come that mental deterioration may be entirely avoided by proper teaching. The very protest that is so frequent in the minds of those who object to the term dementia præcox on the ground that it seems to imply a hopeless prognosis for this group of clinical forms, whereas so many do get well, is a sufficient indication that an abnormal functioning, which is self-limited in many instances and tends to recovery if more or less left alone, can be radically improved by earlier recognition of its fundamental character and the institution of proper physiological correctives.

Teachers are born, however, and not made. Pestallozis and Froebels are as infrequent as Dantes and Goethes, and the applications of pathological pedagogy are in a primitive stage, apart from the tact and insight of the born teacher or the wise parent.

On a priori grounds it is self-evident that the children of abnormal

parents should be brought up with more than the usual amount of care, particularly during the period of puberty and early adolescence. What that "unusual amount of care" really consists in in specific terms does not permit of exact description. We as physicians are called upon to exercise that rarest of gifts, clinical tact, in molding the details of daily life and the modification of the home atmosphere to suit the abnormal child. To do this one often has to go to the earliest years of the child's life and obtain as complete a record as possible of the personality. This opens up the entire problem of the nervous child—here touched upon only in its most general features.

Nervousness in very young children is by no means infrequently observed. Even in the first months of life and among nurslings it shows itself as well. Römer[48] has called particular attention to this subject as occurring in nurslings. In older children one of the first signs of nervousness is disturbance in sleep.—Oppenheim.[49] This shows itself in a variety of ways, but is of particular moment in those in whom yawning and rubbing of the eyes is present, and they are distinctly tired and sleepy. On being put to bed, however, they are soon wide awake, are laughing and playing and become distinctly excited and then exhausted, have a short, restless, unsatisfactory interval of sleep. This should be carefully differentiated as an etiological factor from the same phenomena which may be noted after an overloaded stomach, or due to the presence of worry, or to a late and too violent or prolonged romp, or after the excitement of late travel, of hearing unusual street noises, or seeing sights, a parade, a fire, etc. Restlessness in sleep may often be complicated by definite night terrors, and with definite convulsive seizures, often epileptiform, accompanied by cries and apparent hallucinatory influences. Some of this type of neryousness could be avoided if the children's minds were not excited by tales of a weird and terrifying nature—often told by older brothers or sisters, by servants, or even by parents themselves. The carrying over of the feelings and thoughts experienced in the nightmare to the daily wakened period is of special moment.

Further signs of the nervous child are not to be overlooked. While they cannot be more fully developed at the present time, special stress should be laid upon the observation of attacks of sudden anger and passion, coming often out of a clear sky. Excessive reactions to emotional causes, such as blanching of the child on seeing an accident or during the recital of an exciting passage, the tendency to cringe and hold back on starting to cross a crowded street, etc., are signs of such nervousness. Tic-like movements of the face fingers, or body are to be noted, and special observation taken of the children who are never happy unless surrounded by a store full of toys and who play a few moments with each and are continually dissatisfied. Nervous eye symptoms, asthenopias, should not be overlooked.

[48] Die Psychopathischen Minderwertigkeiten im Säuglingsalter.
[49] Nervenleiden und Erziehung, 1899, p. 47.

The tendency to exaggerate the importance of eye anomalies now so prevalent should not, however, permit one to adopt a *laissez faire* policy. These are among the more important very early physical signs of a nervous child—signs that indicate that these children are worth observation on the part of the pediatrist and the neurologist.

Equally worthy of record are the mental signs of anxiety as a neurasthenic sign in children, which may develop true phobias or impulsive ideas, even imperative ideas and imperative actions. The children who talk about jumping into the water or jumping out of high windows, or wanting to stick a sharp instrument into a brother or sister, those that show impulsive desires to steal, to hoard great quantities of things of a trivial nature, show these imperative modes of action which are signs of abnormal if not unhealthy mental functioning.

Given such indications of the past history and the development of the neurasthenoid states, with other of the phenomena already recorded, our problem is not a simple one. If to these are added attempts to set fire to buildings, strong sexual excitement leading to exhibitionism, the somnambulistic tendencies already spoken of, and the proclivity to continual running away from home, the situation takes a serious attitude. Stress should, however, be laid on the fact that one must not draw conclusions relative to the psychopathic character of the child on one or more signs, but the entire history needs to be carefully weighed.[50]

Inasmuch as a psychological negativism is present in so many of these pre-dementia cases, one of the first questions that arises is, How shall these resisting, self-willed, often cruel or tantalizing young people be corrected? "Spare the rod and spoil the child" is the old maxim, but to apply the rod has its dangers, and is of particular menace in certain types.

The irritable, resisting, and suspicious child is harmed by flogging, almost more than any other type. Any brutal method of punishment for his offensive acts or manners drives him more and more within himself. Suspiciousness becomes generalised. It passes beyond the known source of ill-treatment and begins to include other possibilities, and thus lays the foundation for a paranoid coloring to daily life. Normal natural resentment finds an occasional outlet in sudden, violent outbursts, at times with almost maniacal vehemence, often with alcoholic or sexual accompaniments and disastrous after-results. The intractability which should have been overcome by persuasion or by the careful teaching of cause and effect develops by the flogging method into more than simple resistance. It becomes aggressive revenge, and the entire affective life takes on a negativistic anti-social attitude. This forecasts a struggle with his environment on the part of the individual, and often leads to his ultimate passing into the

[50] Koch, Die psychopathischen Minderwertigkeiten, 1891.

ranks of the insane, or, if the mental breakdown is not too early or too marked, into the criminal fraternity.

Of all reformatory methods, the "big stick" one is the most dangerous in such unstable personalities. With inevitable fatality it drives the boy from home to vagabondage, bad hours, vicious company, and precocious dementia. It is true that the parents' plaint that they can do nothing with such a born vagabond is often only too well founded in fact, but there are many who in early childhood could have had the negativistic tendencies carefully pruned before they choked the entire mental life of the adolescent. The difficulty in such cases usually lies in the fact that the corrective measures are too long delayed. The parents, through no fault of their own, save ignorance, are not able to read the signs and avoid the disaster.

The girl of emotional instability, if unduly stimulated by late hours, too much excitement, often "goes wrong." Her parents' surprise and horror, coupled with their recriminations, drive her from home to become a prostitute. It she possess personal qualifications beyond the average she may live in comfort, and thus forfend the day of disaster, but as a rule, she forms one of a large number of her kind; disease and excitement strain her unstable emotions beyond endurance, and early in life she loses her mental balance. A large percentage of precocious dements among women have just such a history.

Some of these could undoubtedly have been saved by sympathetic and wise treatment at home. If the saving process has not been begun in childhood and the early teens, by regular hours and interesting occupations, the emotionally high-strung girl who has slipped, or who has had some indiscreet adventures, may still grow into a normal woman by their help. The removal of the family to another town, a visit, or travel, to bring new companionship, and the cultivation of new tastes and interests, will often give a girl self-control and respect for a well-ordered mental nature; whereas the slightest invective or harshness will make her sever all her old relations. The narrow path of wisdom that chooses between firmness and overstrictness, between indulgence and sensible sympathy, is a hard one for many parents to find, especially when the uncontrolled emotions of their daughters are the natural sequence of their own lack of control. Nevertheless, the parents or guardians are the responsible ones if in the period of adolescence a girl who is merely excitable and emotional is allowed to run the course which leads to mental destruction.

Probably the most important element in the prophylaxis of dementia præcox for the nation is the forbidding of marriage. The children of such patients almost invariably bear a taint. Nevertheless, the physician seldom has the opportunity to exert his influence: for parents are not in the habit of consulting a specialist to ask whether a hysterical, excitable daughter ought to marry, or whether

the ungovernable temper of a son means mental inequilibrium. The parents hope that the settling-down process of marriage will eliminate unpleasant characteristics, never dreaming that the existence of a certain half-dozen symptoms would indicate to the trained eye the inevitable breakdown of dementia præcox. Could parents, and even the young people themselves, clearly foresee the suffering that would come when the mental decay became manifest, when the husband became a charge rather than a wage-earner, they would agree that it were wise to think twice before consenting to marriage.

When the physician is consulted, the problem of diagnosis requires particularly keen judgment. I have personally known a woman who remained unmarried until fifty, because her physician hinted she might break down mentally, but who eventually, after a sane, keen-minded life, became the second wife of the man who had first wooed her. Her physician's ill advice caused her unnecessary suffering because he mistook nervous tire for a mild psychosis.

On the other hand, it is known that alienists have advised young women to marry, on the ground that sexual completeness will allay their irritation and cure what had been diagnosticated as hysteria. Later when well-marked katatonic signs with dementia have appeared, they have realized that the breaking up of the home and the presence of tainted children have been the direct result of a mistaken diagnosis. Special stress must be laid upon the differential diagnosis of those presenting hysterical symptoms. The so-called hysterical stigmas, such as anesthesias, slight paralyses, etc., are of little value, however, in the differential diagnosis of hysteria from a malign psychosis.

A sharp distinction should be drawn between hysteria and hysterical. Hysterical symptoms are common to all of the psychoses, and, as is well known, are met with in great profusion in the organic nervous diseases. Their presence should not mislead one into making the diagnosis of hysteria, which is a fairly definite affection. Dream states resembling those of hysteria, when accompanied by echopraxia are strongly indicative of katatonia; indeed, Trömner[51] says that this is an almost invariable differental. Command automatism, catelepsy, echopraxia, echolalia, speech confusion may each or all be present in hysteria, but in most of these, close observation, or the interjection of an affective state, will have more influence on the symptoms in hysteria than in dementia præcox, and in spite of the theatrical and impulsive conduct, the signs of mental weakness and primary confusion are more apt to be lacking in hysteria.

I cannot enter into the subject of the differential diagnosis of dementia præcox and hysteria more fully, notwithstanding its impor-

[51] Jugendirresein, 1900.

tance in this respect. Jung's recent work is a classical contribution to this subject. Particular emphasis should be put on the necessity of clearer differentiation of an early dementia præcox from neurasthenia and hysteria, especially in view of the problem of marriage. Manic-depressive insanity in its mild hypomanic phases is also to be borne in mind.

To revert to the subject of pedagogy: the manner and method of education for these children, if helpful in warding off disaster, is of the utmost importance; but we are forced into the most general platitudes when called upon to express in abstract what constitutes an effective prophylaxis. If the questions concerning the general problems of education for the healthy are the legitimate field of so much active discussion, and even acrimonious dissension between pedagogues, surely the more intricate questions of the training of the abnormal child—I do not here refer to the weak-minded or imbecile child—permit of even wider latitude of discussion.

One of the first generalizations that crops up is that these chlidren should lead a simple outdoor life. But, on close scrutiny, of what does this consist? My own observation confirms my belief that this method, as usually practised, is distinctly harmful, for the usual idea underlying its application is that the air will do everything. The difference in air in city and country is a comparatively negligible quantity, and if, added to the change to the country, one has bad cooking, bad roads, poor schools, and poor companions, the "simple life" may prove a hideous mistake. Yet a country life with proper care and surroundings is preferable. Even a simple country school, with few scholars, may be safely chosen, if the teacher be wise and firm. But in the general run, books should be neglected for occupations in the nature of manual and muscular training. I believe very firmly in the teaching, particularly of these queer children, of the small conventions of life, at a time, especially, when they are very naturally acquired. These are the oil of social intercourse, and their early acquisition often saves that embarrassment and even mortification which so frequently follows brusqueness and boorishness, and which leads to brooding and a churlish, solitary, self-centred life.

Sports are highly desirable, but they should not have too strong an element of competition in them, nor should they be advocated to the point of excessive fatigue. Rowing, skating, swimming, and horseback riding are to be classed in the front rank.

Education through the medium of industrial occupation is especially useful. Statistics are not available to show that workers with the hands—carpenters, wood workers, iron workers—are free from dementia præcox, or that these occupations are free from the results of early breakdown, yet the universal experience is that brain workers suffer the earliest, if not the most. Therefore, I feel that industrial training is a desirable mode of occupation for many of those who

are on the brink. Those sanatoria in which the arts and crafts are taught are of great benefit for many of these young people.

Competitive intellectual pursuits are to be carefully avoided. The working out of complex themes, steady composition, much arithmetical calculation are undesirable. Debating, memorizing, and dramatics I consider harmful. In the choice of subjects of study one should avoid the larger problems, that is, those of greatest complexity. The study of sociology has proved, in my experience, the brightest and most destructive flame which has attracted the poor præcox mind. It is a very usual experience to find the paranoid præcox patients striving to understand the unknowable with absolutely not a single fact of the elementary sciences.

To interest these young people in natural objects is highly desirable, but the gamut of the teacher must be wide. The ordinary teacher of science who has mere book knowledge is a hopeless guide. One needs the old-fashioned naturalist tendencies to make the open air interesting and instructive to pupils who have so little tendency to become objective or to see things about them in daily life.

By virtue of the growth in wealth in this country, and the wide dissemination of country homes, with their fully or moderately developed farming addenda, I believe that many young people could well choose the better understanding of agricultural pursuits to the advantage of their mental health. I personally know of a number of men who, recognizing their bad mental heritage and perceiving while still young the strain of urban competition, have changed their mode of life entirely, have taken up agricultural pursuits and are now after twenty years well, strong, and happy, and some even have acquired more than a modest competence. The agricultural courses in our colleges should not be overlooked in this connection.

For the more careful direction of many of these individuals, who unfortunately are left to drift past the time for reconstruction, there is no doubt that specially trained individuals are needed—individuals whose point of view is the understanding and correcting of unhealthy mental habits, life habits of thought which when set show the dysharmony of the individual with his actual surroundings. We have all seen a number of these teachers as they now exist. We may term them tutors or companions or trained nurses, as we will, and employ them to look after abnormal adolescents. Most of the failures that have come to my observation, where financial resources could have rendered the situation ideal, have in large part been due to the fact that the teacher or tutor or companion had been ill prepared for the special problem in hand, and has made a failure of his opportunities. There is a large opportunity for the teaching profession of this country to evolve the mental healer in this sense, otherwise even the crudities of the quackish upstarts will be welcomed by a distressed and despairing public.

THE SURGICAL TREATMENT OF GOITRE.

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The relatively infrequent occurrence of thyroid tumors in most parts of this country accounts in part, no doubt, for the tardy acceptance of operative treatment. A few sudden deaths from fulminating appendicitis or ruptured extra-uterine pregnancy soon convince the profession and the public of any community of the necessity for prompt and radical treatment. On the other hand, the slow growth of a goitre, the gradual development of alarming symptoms, and the small number of cases seen, have made all concerned ready to temporize with useless or even dangerous palliative measures, in spite of the fact that the ultimate outcome in many of these cases is certainly fatal and in almost as large a proportion of cases as with the more acute abdominal diseases just mentioned. In Switzerland, where goitre is a common disease, partial excision of the thyroid gland is as common as appendectomy is in the United States and is more free from danger. Kocher of Bern[1] reported 2160 excisions, with but three deaths in his second series of 1100 cases. Since 1902 the number of operations has increased so rapidly that he has since reported 3000 excisions. At the German Surgical Association last spring he reported that one of his assistants had operated upon 661 patients with but one death.[2] Probably no surgeon has had as great experience as Kocher, but in almost any Swiss clinic the operation for goitre is a daily occurrence, the results are highly satisfactory, and in practically all Europe the surgical treatment of goitre has been for many years a well-established procedure. As compared with statistics of European countries, the number treated in any American clinic is ridiculously small. Indeed, many American surgeons have never done a thyroid excision and apparently many, even among our most progressive practitioners, have never heard of surgical treatment for goitre, or if they have, do not consider it safe to advise for their patients. Although goitre is much less frequent in this country than in certain parts of Europe, there seems to be no reason why we should not offer our patients as satisfactory surgical relief from this distressing condition as is given in other civilized lands. Before discussing this question further it may be worth while briefly to consider the varieties of goitre and a few facts regarding the causes, symptoms, and diagnosis.

Thus far I have used the term goitre in the sense generally employed, meaning any enlargement of the thyroid gland, but these

[1] Chirurgische Operationslehre, Jena, 1902, fourth edition, p. 205.
[2] Annals of Surgery, 1906, vol. xlv, p. 758.

thyroid tumors may be divided into several distinct groups, with widely differing symptoms. Any extended discussion of the histology or pathology of thyroid lesions seems out of place: interest lies mainly along the lines of diagnosis and treatment. Enlargement of the thyroid may result from inflammation, hypertrophy, or tumors. The acute and chronic inflammations of the thyroid are of infrequent occurrence, and the symptoms of inflammation are generally readily recognized. The most important tumors are the various forms of adenoma, carcinoma, sarcoma, and cyst.

Simple and exophthalmic goitre are examples of the hypertrophies. The differences in microscopic structure of these hypertrophies have practical significance, hence, I mention that in simple goitre the enlargement is seen, by microscopic examination, to be caused chiefly by dilatation of the acini with colloid material; in exophthalmic goitre, on the contrary, the colloid material is lessened or even disappears, while there is a process of folding of the wall of the acini, giving increase in size of the gland and a larger surface of epithelial lining. Thus in exophthalmic goitre there is a very greatly increased area of secreting surface; the excess of thyroid secretion giving grave general symptoms. In simple goitre there is slight if any increase in secreting surface and pressure of the contained colloid material may even reduce secretion.

These various forms of thyroid enlargement cause various symptoms, but from whatever cause pressure symptoms are marked from the growth of a tumor of this important organ. Pathological examination is the true basis for classification of these as for other tumors, but we have to deal with three groups clinically: First, the group of tumors in which the symptoms, if any are present, are dependent solely on the enlargement of the gland and pressure on surrounding organs. Simple goitre, adenoma without metastasis, and simple cyst, while differing radically pathologically, all usually produce their symptoms in this way, by pressure only. In the second group we may place the malignant tumors, whether carcinoma, sarcoma, or adenoma with metastasis; these give the signs and symptoms of malignancy, in addition to the pressure symptoms. A third and most important clinical group is that accompanied by pronounced general symptoms, the exophthalmic goitre, usually called Graves' disease by English writers, and Basedow'sche Krankheit, by the Germans. In these cases the enlargement of the thyroid is accompanied by pronounced nervous symptoms, especially tremor, by protrusion of the eyeball, rapid heart beat and other vascular changes. It is important to note that nervous and vascular changes may exist without exophthalmos, or at first nervous symptoms alone may be present or vascular symptoms alone.

As little is known of the causes of goitre as of tumors in general. It is well known that they occur much more frequently in mountainous regions and are especially prevalent in Switzerland and

the surrounding mountainous portions of Europe. I am told b medical missionaries from the mountainous districts of Asia that goitres are extremely prevalent there also and frequently attain enormous size. Goitre patients at Johns Hopkins Hospital usually come from the mountainous districts of Maryland, West Virginia, and Pennsylvania. Exophthalmic goitre frequently follows great nervous strain and has been supposed by some to be a purely nervous affection. Others incline to believe that the nervous symptoms are secondary to the diseased condition of the thyroid. A few observers attribute the disease to toxemia of intestinal origin. The inhabitants of no special country and no race are wholly exempt. It certainly occurs with greatest frequency in young adult females, and pregnancy and child birth apparently have some influence. A great deal has been written on the etiology of goitre, but so few positive facts are known that extended discussion at this time seems unjustified.

SYMPTOMS. With the benign and malignant tumors of the thyroid and simple goitre, symptoms are frequently entirely absent, with the exception of enlargement of the gland. In simple goitre the gradual enlargement of the thyroid may be associated, in the early months and years, with slight nervous symptoms, even palpitation and tremor. For this reason the early stage of a simple goitre may be mistaken for Graves' disease, but in these cases exophthalmos is said to be always absent. When exophthalmic goitre has existed for some time the bulging of the eyes, tremor, palpitation, and extreme nervousness, associated with enlargement of the thyroid form a striking clinical picture. Most of us are familiar with the eye symptom pointed out by von Graefe: the upper eyelid fails to follow the eyeball on looking down; and Stelwag's symptom, the apparent widening of the palpebral slit. When enlargement of the gland becomes great, difficulty in breathing and swallowing, change in the voice, cough, and sometimes even bloody expectoration are noticed. These symptoms, associated with a large goitre, are much less likely to be dangerous than when the enlargement is comparatively small, for then infiltrating carcinoma should be suspected.

Early diagnosis of enlargements of the thyroid is a matter of great importance. Kocher, Bloodgood, and others, have emphasized the fact that it is impossible to tell whether a tumor of the thyroid is malignant or not in the early stages of the disease, and unless a malignant growth of the thyroid is removed very early the condition becomes inoperable. At the Johns Hopkins Hospital the proportion observed has been 10 malignant tumors to 52 benign tumors; almost 20 per cent. and so large a proportion that the danger of temporizing with any thyroid tumor is easily seen.

TREATMENT. The question of treatment is one of great interest and of the greatest importance to our patients. Osler[3] declares

[3] Practice of Medicine.

that medicinal measures are notoriously uncertain, and the multitude of methods which have been suggested for exophthalmic goitre gives sufficient evidence of failure. One observer insists on the importance of directing treatment to the circulatory organs or perhaps the heart alone; another to the sympathetic nervous system, or some part of the general nervous system; another to the intestinal tract; another to the thyroid gland itself; one uses strong, another weak electric currents. Recently organotherapy has attracted much attention. Serum has been prepared from dogs and calves whose thyroids were previously removed; the milk of thyroidectomized she-goats has been employed under the name rodagen; the blood of patients suffering from myxedema has been injected; guinea-pigs, rabbits, roosters, and geese have been experimented with and more or less enthusiastic reports of results obtained have been given. Perhaps the most promising of the serums is that prepared by Beebe[4] from the thyroid of two persons who died from exophthalmic goitre. Rogers[5] and others have obtained promising results from the use of this serum, although very alarming symptoms were produced in some cases and no improvement in several. In his latest report Rogers gives four deaths in 54 cases treated by serum. Rhein[6] after reviewing numerous forms of organotherapy, expresses doubt whether the results are more encouraging than those obtained by the usual well-recognized therapeutic measures. It would seem that in spite of all efforts patients still remain uncured and experimenters are still looking for something new as a specific for exophthalmic goitre. While the internists have been treating almost every organ in the body, from the intestinal tract to the thyroid itself, with all kinds of drugs, serums, and extracts, made from animals and men, dead and alive, applied locally and taken internally, a few surgeons have been excising a part of the thyroid with most brilliant results in case of simple goitres and benign tumors, and although the mortality has been higher in exophthalmic goitre, the results have, on the whole, been better than in those treated medically, particularly when the unfavorable condition of the patient operated upon is considered. Recovery is very rapid after operation in these cases. There is little or no postoperative discomfort; usually immediate slowing of the pulse and relief of nervous symptoms. All of my patients have sat up in bed on the third day after the operation and have been out in a wheel chair on the fifth day. The scar left is practically invisible and is so low down that it is covered by the collar. Ten patients have come to me for operation within six months, and the extreme gratitude of these and all previously under my care, for their relief from their sufferings, has been such as I have never seen in the results of any other operation.

[4] Jour. Amer. Med. Assoc., 1906, xlvii, 661.
[5] Ibid., 665.
[6] Amer. Med., 1906, xii, 164.

It is true that these operations involve several special dangers and difficulties: when greatly enlarged the thyroid gland is always in direct contact with the great vessels and nerves of the neck for some distance; frequently the great vessels are considerably displaced from their normal relations; in 3 out of 10 of my own cases the growth extended down into the thoracic cavity behind the clavicle and sternum in close relation to the apex of the pleural cavity; in all cases the thyroid gland is friable and the vessels are thin walled, easily torn, and capable of giving terrific hemorrhage.

In no modern procedure has there been a greater difference in the results of operative treatment. Why should some surgeons report a death rate of 10 per cent., others a mortality of less than 1 per cent.? This leads me to ask if surgery of the thyroid should not, for the present, be referred to those who have proved their ability to operate successfully. Should not the surgeon undertaking excision of the thyroid be familiar with details of the normal anatomy of the neck and upper thoracic cavity, with anomalies, which are of frequent occurrence, especially in the arterial and venous supply, and with the pathology of the thyroid lesions most frequently met? Would it not be worth while for the surgeon whose mortality rate has been over 1 per cent. in these operations, or especially those who are undertaking the operation for the first time, to take the trouble to visit Kocher's Clinic, or that of some other surgeon with a record for success in this operation, and carefully note the methods used? If all men had given themselves such preparation I believe many fatalities would have been avoided.

The experience of a number of surgeons, as shown by the statistics I have quoted, proves that the mortality can be reduced to 1 per cent. or less in simple goitre operations performed under local anesthesia. In view of these facts I quite agree with Kocher who states, that "It is not justifiable for physicians to introduce and follow medicinal treatment for a long time, when from the very beginning it is evident that it can be of no use. So soon as the goitre becomes dangerous, when there is much difficulty in breathing, or inflammatory changes; so soon as there is the slightest suspicion of malignant degeneration, operation is indicated. Suspicion of malignancy is always present when a person over thirty years of age shows enlargement of the thyroid without any definite cause. Unfortunately the majority of malignant goitres, which are not so uncommon even in relatively young persons, almost always come to the surgeon so late that radical operation is impossible. Goitres which are growing in the direction of the thoracic cavity are also dangerous, and should be operated upon. All goitres which reach a considerable size should be removed, and especially when even in a slight degree symptoms of Graves' disease are present, operation is the best means of pre-preventing the further development of this serious disease."

It is not my purpose to discuss methods of operation in detail.

Such matters may be interesting to those who are devoting their attention to surgery, but they have little interest for the average practitioner. Personally, I always use local anesthesia and have found it entirely satisfactory. By its use time may be devoted to painstaking dissection, so necessary where many important anatomical structures are concerned, without the feeling that injury will result from prolonged anesthesia. The extreme discomfort caused by retching and vomiting after extensive dissection of the neck is avoided. Perhaps most important of all is the greatly reduced hemorrhage; everyone is familiar with the congestion of the face and neck which frequently accompanies the use of ether and can appreciate how much the overdistension of the veins in general anesthesia would add to our difficulties. I believe with Kocher, Witherspoon, and numerous others that the use of general anesthesia adds great danger in goitre operations. Witherspoon[7] states that all patients suffering from exophthalmic goitre are affected unfavorably by general anesthesia, whatever the nature of the operation, and whether the thyroid gland is handled or not. He mentions a case in which alarming symptoms followed the use of general anesthesia for curetment. The symptoms which he reports are similar to those generally considered the result of thyroid toxemia from squeezing the secretions of the gland into the circulation by handling during the operation.

The incision should be long. I prefer the transverse collar incision of Kocher, which with careful closure, leaves little scar, and that located so low that it is easily covered. In order to avoid scar I close the wound with the finest embroidery needle, using very fine horse hair as a suture material. Such careful closure requires much time, but if local anesthesia is used this is a matter of little consequence.

The applications of regional anatomy in this operation are numerous and important. All larger branches of the superficial cervical and supraclavicular nerves of the cervical plexus may be avoided by placing the transverse incision between their regions of distribution, thus making local anesthesia simple and satisfactory. In dissecting the flap upward to expose the thyroid, these nerves and their branches may be entirely avoided, for the nerves pass through the platysma near their origin. Both the nerve trunks and the skin they supply are lifted with the flap which includes the fascia beneath the platsma. I am not aware that this great aid to the success of local anesthesia has been previously referred to by any writer on this subject. The muscles attached to the larynx should be dissected carefully, divided near their upper attachment so as not to injure their nerve supply which enters the muscle near its middle, and after removal of the goitre, carefully sutured. This

[7] Trans. Amer. Med. Assoc., Section Surgery and Anatomy, 1903, 344.

will prevent much deformity of the neck and disability in using the larynx. The dissection should be most careful. The superior thyroid artery should be secured first, then after freeing the goitre from its attachments, it can be dislocated from its bed and the inferior thyroid artery secured. All large veins should be isolated and tied, as far as possible, after the arteries are secured. If these precautions are followed the hemorrhage will be trifling. The capsule on the side toward the larynx should be separated with a small portion of the gland itself in order certainly to avoid injury to the recurrent laryngeal nerve. This should also be carefully avoided in tying the inferior thyroid artery. With the strictest aseptic precautions and careful observance of these details, I believe that the results obtained will be most satisfactory.

The prognosis in thyroid tumors is more dependent upon prompt and proper treatment than in most diseases. In this connection we have to consider, first, the immediate operative mortality; and second, the prospect of permanent relief. As regards danger to life there has been great improvement in the results in recent years. In 70 operations for ordinary goitre before 1850, Kocher placed the mortality at 40 per cent. In 400 operations between 1850 and 1883, it fell to 15 per cent. while, since 1883, it has steadily fallen to less than 3 per cent. Kocher's own being 0.4 per cent. in simple cases. Dr. Finney, of Johns Hopkins Hospital, tells me that he has had no deaths from the operation, including his cases of exophthalmic goitre. Bloodgood reports no operative mortality and no recurrence following operations for cysts[8] in a large series of cases, and in 1 case of malignant tumor removed early[9] the patient has remained well six and a half years. The results of operative treatment vary greatly in the hands of different operators, but several surgeons have reported a mortality of 1 per cent or less.

Charles H. Mayo[10] says: "The public has learned that operations on goitre are not fatal as were supposed from the results obtained when operations were made as a last resort on patients suffering from this disease and in a moribund state. The fact is that the mortality attending the operation (excluding cancer and advanced cases of exophthalmic goitre) compares very favorably with other major surgery; and, in the hands of those experienced, with much of the so-called minor surgery." As regards the second question, the ultimate relief, there is every prospect of permanent cure except in malignancy or exophthalmic goitre. Wolff's statement that when one-half of the gland has been excised for hypertrophic goitre the remaining half always diminishes, is confirmed by Riverdin, Kocher, Mayo, my own experience, and that of others. In cases of exophthalmic goitre, not in extremis, the improvement following

[8] Surgery, Gynecology, and Obstetrics, 1905, vol. i, p. 113.
[9] Ibid., 1906, vol. ii, p. 121.
[10] Jour. Amer. Med. Assoc., 1907, xlviii, 273.

operative treatment has been very encouraging. At least 50 per cent. of the patients have been entirely relieved and in a large proportion of the remaining cases there has been great improvement. This is a far better showing than can be made for any or all of the other methods which have been given extended trial in the treatment of exophthalmic goitre. Let us compare the results in cases treated medically. Williamson[11] reports 24 cases treated medically with fatal termination in 6 (25 per cent.), improvement in 7, condition much the same in 3, and almost complete recovery in 7 only. Möbius[12] quotes statistics from five authorities and the estimate of mortality is from 10 per cent. by von Graefe to 25 per cent. by Charcot, in cases treated medically. Mayo quotes Ord and Mackenzie who tabulated 56 medical cases of exophthalmic goitre which had lasted five years or been fatal. There were 10 recoveries, 11 made incomplete recovery, in 13 there were considerable improvement, 4 were unchanged, and 14 (25 per cent.) were fatal. Others make more favorable reports. Osler says, "A certain proportion of the cases recover, but when the disease is well developed recovery is rare." These eminent internists give a much graver prognosis for cases treated medically than may be offered to patients treated surgically. No competent surgeon should have one-half as great mortality as they give. For my own experience, in 6 of the 16 cases who have recently consulted me I have advised trial of palliative measures. One of these patients, a girl just past puberty, is apparently improving; 4 remain about the same and there is certainly no urgent need of operation; in 1, after several months of treatment, as the growth had increased and the symptoms become more annoying, the patient decided to undergo the operation, the result from which has been entirely satisfactory. Thus I have referred back to the internist for treatment nearly one-third of my cases, yet in only 1 case has there been definite improvement. But what can be expected from medical measures in the case of an enchondroma so large as to cause great difficulty in breathing and swallowing, as in 1 of my cases; or in the case of a cystic goitre so large that the woman had been unable to swallow meat or other solid food for two years, as in another of my cases. The physicians who had charge of these women would have unhesitatingly advised removal of an ovarian cyst of half the size, causing far less distressing symptoms, or a breast tumor no less likely to be malignant. I am sure the question may be left to the judgment of anyone whether operation is not the only rational treatment for all benign and malignant tumors of the thyroid, as it is for tumors in other parts of the body.

In 10 of my operative cases, there was extreme discomfort, and in several, symptoms dangerous to life, yet operation had been pre-

[11] Brit. Med. Jour., November 7, 1896.
[12] Nothnagel's specielle Pathologie und Therapie, Band xxii, p. 65.

viously advised in only 1, and in several cases the patient was advised against operation by prominent physicians. Can it be that the internists who had charge of these patients had attempted to follow the after-results of their treatment and realized the absolute failure of medical measures to give permanent relief? Is it not time that the results of excision of the thyroid in the hands of experienced men should be recognized? Is there any other operation of equal gravity which has been performed by any man with but one death in 661 cases, as in Kocher's latest report?

In closing, I would again emphasize the importance of early diagnosis, when in some cases there is still hope of relief by palliative measures. I would refer once more to the grave prognosis in all well-developed cases of exophthalmic goitre; to the difficulties of distinguishing benign from malignant tumors of the thyroid in the early stages of development; to the frequency of malignancy and the absolutely hopeless prognosis in malignant cases unless the growth is excised early, before a positive diagnosis can be made. I would again mention that reports of cases treated by medical measures alone show a death rate higher than those operated upon, and this in spite of the fact that usually only the most unfavorable cases have been submitted to excision; that operative measures have cured or relieved a proportionately larger number than any (I might almost say all) other treatments. In view of these facts it seems clear to me that all patients resisting the approved therapeutic measures should be urged to consult a competent surgeon.

TENDON TRANSPLANTATION IN THE TREATMENT OF CONGENITAL AND ACQUIRED TALIPES.

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The general surgeon has always been more or less dissatisfied with the treatment of deformities by means of apparatus, and, has, whenever practicable, preferred operative treatment, with its rapid results, to the slow and at times unappreciable progress which is attained by the use of braces. It is, however, chiefly owing to the teaching of Vulpius in Germany, and of Tubby and Jones in England, themselves orthopedists, that tendon transplantation has become a recognized form of treatment for paralysis. In this country it does not appear to have been very widely employed heretofore, and patients with infantile palsy have drifted about from one clinic to another, or, in rare instances, have grown from children to adults under the care of one individual. And though it cannot be denied that the treatment by apparatus is a great help, not only in increasing

the power of locomotion, but also in aiding the paralyzed muscles to regain their strength, yet when all has been said in its favor, and when the patients have faithfully done their part in the treatment, the fact remains that after all the limb is still paralyzed, and is in many cases nearly useless without the brace, or would soon become so through contractions of healthy muscles, were the support of the apparatus to be discarded.

In regard to congenital club foot, the general surgeon has been in the habit of resorting to open operation to correct the deformity more frequently than the orthopedist, who has usually preferred repeated stretchings (*redressement*, *Mobilisirung*), and retention with a brace. Astragalectomy, cuneiform tarsectomy, as well as open tenotomies and fasciotomies, although satisfactory for the time being, are very apt to prove merely temporary successes, especially in dispensary patients, who when not under constant observation frequently return after eight months or a year with a deformity very nearly as marked as before the first operation. In these cases the cause of the recrudescence of the deformity is not regeneration of the excised bone; and to attempt a cure by further excisions is evidently futile. The deforming factor now, as in the first instance, is the action of one set of muscles to the annihilation of another set. By this constant distortion of the foot the child's weight is not brought squarely on the sole, and the bone is forced to adapt itself to the changed conditions and the altered pressure, just as the infant's more pliable bones were during intra-uterine and early postnatal life. Whether the so-called congenital club foot, seen in its typical form as equino-varus, may with justice be considered a sequel of fœtal anterior poliomyelitis, does not concern us here. The feet which relapse after full correction and temporary retention by plaster and braces do so because the distorting muscles are stronger than those opposed to them, precisely as in the case of infantile palsy; and there is, therefore, no good reason *a priori* why tendon transplantation should not be adopted as a cure in these as well as in cases of infantile paralysis.

It remains, of course, to select the cases. Needless to say, the majority of patients with congenital or acquired club-foot will not require operation. By correction of the deformity and retention in proper position by apparatus for six months or a year, the weaker groups of muscles will recover their power more or less completely, and though the feet may never be as perfectly shaped or be used as gracefully as normal feet, yet they will be inconspicuous when covered by shoes, and will be eminently useful.

Considering the patients with infantile palsy first, it may be said that as a general rule from one to two years should be allowed to elapse between the onset of the paralysis and the resort to tendon transplantation. Some surgeons think six months a sufficiently long time to wait for return of power. From my own observation, however, I am quite sure that this is not giving the paralyzed muscles

a fair chance. Not only should massage and electricity be resorted to, in the effort to maintain nutrition, but the weak muscles should be relieved of all strain; for they will thus be enabled to acquire strength very much more rapidly. This fact has been well recognized since Owen Thomas drew such prominent attention to it. It is indeed surprising to see muscles, which at first appear hopelessly paralyzed, gradually regain strength when all excessive labor is removed from them by the use of a proper brace. I have in mind now a child who came to the Orthopedic Hospital in October last, with apparently complete paralysis of all the muscles on the anterior aspect of the foot. The paralysis, due to anterior poliomyelitis, was of some six years duration; and she had received no treatment for it. It was especially noted that there was paralysis of the extensor longus digitorum, among other muscles. After wearing a brace for four months, to support the foot, thus overcoming the ankle-drop and relieving the long extensor of all strain, this muscle gradually regained its strength, and she could by February quite forcefully extend the toes. It is not, of course, likely that the remaining paralyzed muscles will recover also, and she will in all probability still be forced to have some tendons transplanted to assist this muscle in its work; but certainly it would have been bad surgery to plunge in at once and operate before making trial of other methods. Nor is this an isolated case. Such patients are encountered by observant surgeons everywhere.

But when a patient has been under competent surgical treatment for a year or so following the paralysis, and after massage, electricity, and relief of the paralyzed muscles from strain have all been tried, it is almost certain that no further improvement will occur; and at this stage tendon transplantation offers the best prognosis.

Nerve transplantation may be considered as an alternative. Having had no personal experience with the operation, I cannot speak with as much confidence of it as I can of tendon transplantation; but there are several theoretical objections which may be urged against it. In the first place its field is much more limited, for it is useless to transplant nerves except when the palsy is exclusively confined to the distribution of one nerve, and when all the muscles supplied by that nerve are affected. Thus, if the tibialis anticus is paralyzed, but not the extensor proprius hallucis nor the extensor longus digitorum, transfer of the anterior tibial nerve into the musculocutaneous might possibly restore its power to the tibialis anticus, but the risk of failure would remain, and the very much greater risk would exist of permanently paralyzing the other muscles supplied by the anterior tibial nerve. A further objection to nerve transplantation is its uncertainty, and the long period over which this uncertainty as to results extends. It is no unusual thing for the nerve into which the transplantation is made to be itself paralyzed by the operation, and I have known this paralysis of the healthy

nerve to persist (in the upper extremity) for three months or more; and at the end of that time it will still be uncertain whether the paralyzed nerve will ever transmit stimuli received through its new anastomosis. The question of the extent to which the degeneration of the paralyzed muscles has gone, must also be considered in the attempt to restore their contractility by nerve impulses. In tendon transplantation, on the other hand, the field is limited only by the number of tendons available; the results are definite and prompt; and no danger exists of rendering the paralysis worse than before the operation was done.

In congenital club-foot it seems safe to allow a longer period to elapse before resorting to tendon transplantation. Here, too, it is probable that correction of the deformity and maintenance in the corrected position, will, by facilitating the normal action of all the muscles, soon render the weaker groups powerful enough to hold the foot straight. If failure attends these efforts, and especially if maintenance of the normal position proves impossible, then resort to tendon transplantation will hasten a cure, and enable braces to be promptly discarded.

As preparation for the operation it is above all things essential that the foot be easily retained temporarily in the desired position, preferably in over-correction. This is to be attained by the usual methods of manipulation, stretching, and by tenotomies when necessary. When the foot has been made almost flail-like, so that its over-corrected position can easily be maintained by the pressure of one finger, then it is ready for the transplantation. It is best not to transplant at the same sitting at which a forcible stretching, under ether, is done. As a rule this procedure causes a certain amount of contusion and œdema, and would predispose an open wound to infection. Ten days or two weeks after the foot has become perfectly flaccid by stretching, the cast used for retention may be removed, and open operation performed. If necessary, of course, several stretchings are to be done before the final operation of tendon transplantation.

The technique of the operation is sufficiently simple, but requires an accurate anatomical knowledge, which is scarcely less important than the knowledge of the functions of the various muscles, on which the principle of the operation is based. The use of an Esmarch bandage considerably accelerates matters, since veins may be seen and avoided, and all the dissections are rapid and bloodless. The band should be placed *above* the knee, so as in no way to constrict the muscles it is proposed to transplant. It is needless to say that the surgeon must have decided positively on the method of operation before ether is given.

Periosteal implantation is generally acknowledged to give better results than transplantation into another tendon; and a more sure result will also be obtained by transferring a healthy tendon to the

place of a weak one, than by suturing the distal end of the paralyzed tendon into a normal tendon. The typical operation is that for varus, where the peronei are paralyzed or weak, and where the tibialis anticus is the deforming factor. In such cases, therefore, separation of the tibialis anticus from its insertion, and its subcutaneous transference to the point of insertion of the peroneus brevis, with its suture firmly into the periosteum at that point, will give a much more satisfactory result than will division of the peroneus brevis some distançe from its insertion, and the transference of its distal end into the tibialis anticus. More satisfactory results also will follow transplantation of an extensor tendon for extensor paralysis, or of a flexor tendon for flexor paralysis, than will attend the use of a flexor muscle to overcome extensor palsy, or vice versa. Yet when all of one group of muscles are paralyzed, it may then become necessary to transplant a muscle whose function is directly the reverse of that we wish to develop. Thus in Case II, in which there was paralysis not only of the anterior tibial group but of the peronei and of the tibialis posticus as well, I was forced to take the flexor longus hallucis, which was strong and a deforming factor, from the sole of the foot, and bring it forward through the interosseous membrane to the dorsum of the foot where it was sutured to the extensor longus digitorum.

The incision to separate from its insertion the tendon which it is desired to transplant need not as a rule be long. It is made in the line of the tendon; the sheath is opened, the tendon is grasped by clamp forceps to keep it from retracting when cut, and it is then cut at the desired point. The tibialis anticus must be shaved from the scaphoid and internal cuneiform bones, as it is none too long to reach to the insertion of the peroneus brevis. Longer tendons may be cut higher, and their distal ends sutured to neighboring sound tendons, as in the case of the extensor longus hallucis, whose distal end may be sutured to the extensor longus digitorum. The next step usually is to bare the tendon above the annular ligament, and draw it out here. Then an incision is made over the desired point of insertion, and by burrowing a subcutaneous channel up to above the annular ligament the tendon is caught in forceps, or attached by sutures to a probe, and drawn down to the point where it is to be permanently anchored. The incision over this latter point should not be made precisely in the line in which the transplanted tendon will pull, since the tendon might delay union of the skin by tension. It is better to make an incision oblique, or a little to one side, or even to turn up a flap of skin if more room is required.

The suture material is a matter of some discussion. Some surgeons think silk is preferable, because it is permanent, and hence there is thought to be less danger of the tendon pulling loose. Having had precisely this experience, however, with the patient in Case IV, in whom silk was the suture material employed, I feel rather

partial to chromicized catgut, which has given perfectly satisfactory and thus far at least perfectly permanent results. The transplanted tendon should be sutured with the utmost possible tension, and with indubitable security. A fairly heavy needle and thread are required, and mattress sutures are the best. The knot should never be on the tendon, but is preferably placed to one side or other. In some cases, as in suturing the tibialis anticus to the tuberosity of the fifth metatarsal bone it is possible to place the knots in the sole of the foot, suturing through the bone—which is cartilaginous in children The knots should not be in any position in which they may subsequently cause annoyance. This applies especially to silk, which is not absorbed. In the sole of the foot they are protected by so thick a pad of fat that no trouble need be expected.

The skin wounds are closed with chromic gut, and the foot is dressed before the Esmarch band is removed. The limb is kept elevated both while the plaster is being applied, and for forty-eight hours subsequently in bed.

The cast may be changed at the end of three or four weeks, if it seems desirable to do so; but free motion of the foot should not be allowed for six to eight weeks. It is exceptional then for a brace to be required; but in some cases of extensive paralysis it may be advisable to continue the support to the foot for some months. Usually an ordinary shoe may be worn, or one with the sole raised on the transplanted side, the outer side raised for varus, the inner raised for valgus deformities.

For permission to operate on and to report the following cases I am indebted to Drs. G. G. Davis, and R. H. Harte, in whose services at the Orthopedic Hospital they occurred.

Case I.—Israel S., aged seven years, entered the service of Dr. Davis at the Orthopedic Hospital, January 23, 1906. He had been born with marked equinovarus of the right foot. Until the age of four years he had been under treatment at another hospital in this city, where tenotomies of the tibialis posticus, tendo Achillis, and plantar fascia were done. The fact that the posterior rather than the anterior tibial tendon was divided shows the extreme grade of deformity present. Since the age of four years he has worn a brace, but has not been under surgical observation, the brace being repaired by the maker from time to time. When first seen at the Orthopedic Hospital, there was still present marked varus, the equinus having nearly disappeared. The foot was forcibly stretched the patient being anesthetized, February 2, April 27, and May 17, 1906. In spite of complete over-correction of the deformity, the peroneal muscles remained powerless to hold the foot in the corrected position, and tendon transplantation was determined upon. On June 15, 1906, the tibialis anticus was separated from its insertion into the scaphoid and internal cuneiform bones, and by means of a fine-pointed bistoury the sheath of the tendon was slit up through

the annular ligament without making a separate wound above this latter structure to draw the tendon out. An incision was then made over the tuberosity of the fifth metatarsal bone, and the tendon was transplanted subcutaneously across the dorsum of the foot from one wound to the other. By placing the foot in the position of valgus deformity the tendon of the tibialis anticus could now be made to reach the desired point, with great tension. By means of a strong curved needle, entered on the plantar aspect of the metatarsal bone, a mattress suture was inserted through the transplanted tendon, which was thus firmly pulled down and united to the periosteum, the knot being placed on the sole of the foot, and the suture passing through the bone. A second suture of chromic gut united the transplanted tendon to the tendon of the peroneus brevis, just at its insertion, and a third suture was passed through the fascia

FIG. 1.—Case I. Congenital varus of the right foot, after operation.

and periosteum on the dorsum of the foot. The skin wounds were closed with chromic gut, and a plaster cast was applied. The time of the operation was thirty-five minutes. The cast was removed July 20, five weeks after the operation. The transplanted tendon could be easily seen and felt beneath the skin in its new situation, and by its contraction effectually prevented the previous varus deformity. Four days later the patient was allowed to walk. To prevent any undue strain on the foot, he was directed to have the outer side of the sole of his shoe extended and raised a quarter or three-eighths of an inch. An instep strap was also applied. Fig. 1, from a photograph made March 5, 1907, shows the shape of the foot at that date. As he still has a tendency to wear down the outer side of his heel, he still uses a shoe with the sole raised on the outer side.

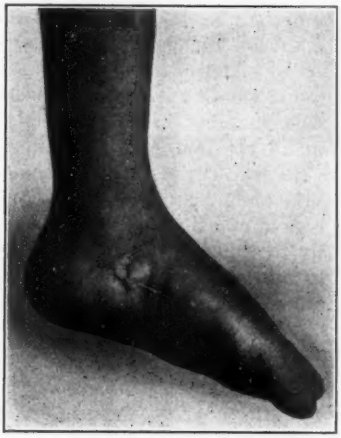
CASE II.—Tony M., aged four years, entered the service of Dr. Harte at the Orthopedic Hospital, April 26, 1906. At the age of fifteen months, some time after learning to walk, he had an attack of poliomyelitis which left his left lower extremity nearly powerless. About one year after this attack he was brought to the Orthopedic Hospital and there fitted with a brace, which he wore until admitted to Dr. Harte's service in 1906. Without the brace he could walk only with great difficulty. His foot was in the position of equino-varus, and without the brace he walked on the outer surface of his foot and on the external malleolus. There was complete loss of power in the tibialis anticus, the extensor longus digitorum, and extensor longus hallucis, in the peronei muscles, and only very slight power in the tibialis posticus, the calf muscles, and the flexor longus digitorum. The flexor longus hallucis alone appeared to be normal in its contractility, and was also a deforming factor, aiding in producing the equinus and the varus, and drawing the great toe into a position of marked flexion. The tendo Achillis was contracted, and it was impossible to bring the foot up to right angles with the leg. On May 3, 1906, under ether anesthesia, the tendo Achillis was cut, and the foot was forcibly stretched, until it could be made to assume the calcaneo-valgus position. The great toe was even more distorted by the contraction of the flexor longus hallucis, but it was not thought advisable to divide this at that time. The patient was kept in bed for twelve weeks, while the recuperative powers of the various muscles were being tried under the influence of mechanical support, massage, and electricity. At the end of this time, as very little if any improvement was noted, it was determined to try a tendon transplantation, as arthrodesis is rarely satisfactory at so early an age. The only strong tendon being the flexor longus hallucis, and this also being a deforming factor, it was decided, after consultation with Drs. Harte and Davis, to attempt its transplantation to the dorsum of the foot, through the interosseous membrane. It was thought that since the muscle lay close against the interosseous membrane, it would be more effectual to bring it directly through than to bring it around the internal surface of the tibia. Accordingly, on July 26, 1906, under ether anesthesia, and with an Esmarch bandage applied, an incision was made along the inner border of the sole, about two inches in length. The abductor hallucis was separated from the plantar fascia and the flexor brevis digitorum, exposing the internal plantar artery and nerves. These were drawn to the inner (tibial) border of the sole, along with the abductor hallucis, and the flexor longus digitorum was recognized. Between this and the metatarsal bones, the tendon of the flexor longus hallucis was detected, and its identity was proved by its function. It was then divided, and its distal end sutured to the tendon of the flexor longus digitorum, while its proximal end, after freeing the tendinous slip which passes from it to the tendon of the

flexor longus digitorum above the point of section, was then drawn out of the wound. A second incision was then made along the inner side of the tendo Achillis, back of the inner malleolus, and the tendon of the flexor longus hallucis isolated just to the posterior side of the posterior tibial nerve. The tendon was then drawn out of this wound. By means of a periosteal separator the interosseous membrane was then perforated, keeping close to the fibula. A third incision was then made on the point of the periosteal separator, between the tendons of the tibialis anticus and extensor longus hallucis. The tendon of the flexor longus hallucis was then drawn through the interosseous membrane, and the point to which it would reach on the dorsum of the foot was determined. It was found to be amply long to reach to the point where the common extensor divides into its several tendons. A final incision was then made obliquely over this region, and the transplanted tendon was brought down subcutaneously to the desired point. It was here sutured, with chromic gut, to the "middle" and "ring" tendons of the extensor longus digitorum. All the incisions were then closed with chromic-gut sutures. The operation consumed nearly fifty minutes. The plaster cast was not removed until August 30, or nearly seven weeks after the operation. When the patient was told to flex his toes, the great toe and others were flexed, but the tendon of the transplanted flexor longus hallucis could be seen to contract on the dorsum of the foot. The notes say: "He walks with his ankle stiff, there being no apparent ankle-drop." As he had also paralysis of the quadriceps extensor femoris, with consequent inability to extend the knee, a brace was ordered to overcome this defect, and to support the foot until such time as further operative treatment should seem advisable. Since leaving the ward he has continued to have massage and electricity, as an out-patient, and the limb has gained considerably in strength. He can walk well without the brace, the sole of his foot coming fairly flat on the floor, whereas before the operation he could scarcely walk at all without the brace, and the outer surface of the foot and the external malleolus rested on the floor. There is still some tendency to varus, but the ankle-drop is very slight, and the power of voluntary extension of the knee has largely returned. Figs. 2 and 3, from photographs made in November last, show the location of the incisions and the extent to which the deformity has been corrected.[1]

CASE III.—Eva S., aged four years, entered the service of Dr. Davis at the Orthopedic Hospital, November 18, 1902, when ten months old, with congenital equinovarus of the right foot. The foot could then readily be brought into good position She was fitted with a brace, and wore this constantly. The foot, however, could

[1] Since the above was written Vignard (Lyon méd., 1907, cviii. 575, March 24) has reported transplanting the tendo Achillis through the interosseous membrane, to the dorsum of the foot, to overcome toe-drop.

not be made to stay in the correct position without the brace. On August 29, 1905, the foot was forcibly stretched (ether) so as thoroughly to over-correct the deformity, in the hope that this would enable the weak peroneal muscles to do their part in holding the foot straight. The patient wore the brace again constantly until



FIGS. 2 and 3.—Case II. Paralytic equinovarus, after operation.

October 27, 1906, when tendon transplantation was done, because, though the foot was perfectly flaccid and could easily be brought into the over-corrected position, the peronei seemed absolutely powerless to hold it straight. The tibialis anticus was strong, and constantly pulled the foot into a marked varus deformity, unless

restrained by the brace. The operation in this case was precisely the same as in Case I, except that silk sutures were employed. The time was twenty minutes. After some weeks the patient was sent home still wearing the cast. While at home she developed a very severe attack of conjunctivitis, for which she was admitted to another hospital. As a consequence it was not until January 8, 1907, or nearly eleven weeks after the operation, that she returned again to the Orthopedic Hospital. Removal of the cast on that date showed that the skin wound over the outer side of the foot had not entirely united, and that two silk sutures were protruding. These were removed, and a cast was again applied. January 15, this cast was removed and the skin wound was found to have united solidly. She was directed to wear an ordinary shoe and return in four weeks. On February 12, it was found that active motion pulled the foot into varus, suggesting that the tibialis anticus had slipped from the tuberosity of the fifth matatarsal bone, when the silk sutures separated by sloughing. On March 1, the patient was etherized, and the tibialis anticus separated from the dorsum of the foot, where it had become adherent between the first and second metatarsal bones, and again sutured to the tuberosity of the fifth metatarsal bone, with silk sutures. The result this time was excellent.

Case IV.—Mary M., aged twenty years, entered the service of Dr. Davis at the Orthopedic Hospital, March 23, 1897, when twelve years of age. She had had an attack of poliomyelitis when about one year old. She was wearing a brace which had been ordered elsewhere. Without the brace her foot assumed a fairly marked varus deformity, owing to the paralysis which affected chiefly the peroneal muscles. The patient neglected treatment, returning once to the hospital in May 1898, but not again until November 20, 1906. It was now found that a moderate degree of varus persisted, owing to paralysis of the peronei, and that the tibialis anticus was also very weak. Dr. Boyer, who examined the foot electrically, reported that the tibialis anticus and peronei responded slightly to both galvanic and faradic currents, but not normally. No reactions of degeneration were present, however. The patient was very stout, and her foot was constantly turning under her; indeed, she stated that for some months she had been unable to walk a square without falling. Fig. 4 shows the degree of deformity present, as well as the contraction of the great toe due to the action of the extensor longus hallucis. On December 29, 1906, the patient was etherized, and the extensor longus hallucis was divided on the dorsum of the foot, its distal end being sutured to the neighboring tendons of the extensor longus digitorum, and its proximal end being transplanted to the tuberosity of the fifth metatarsal bone. It was sutured to the periosteum at this point by four chromic gut sutures. The patient had been operated on by tracheotomy when a child, and she took ether badly; the operation was also done without an Esmarch

bandage. For these reasons the time consumed was an hour. The cast was changed January 29, 1907, but was not finally removed until February 26, when the patient was directed to wear an ordinary shoe. Fig. 5 shows the foot in the position obtained by the operation and

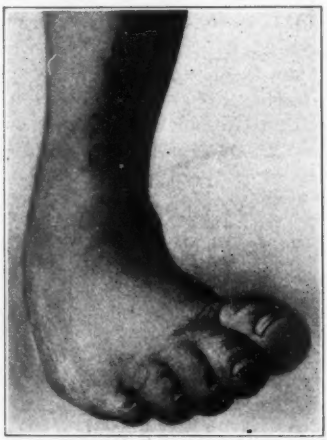


FIG. 4.—Case IV. Paralytic varus of the right foot, before operation.

FIG. 5.—Case IV. Paralytic varus of the right foot, after operation.

the absence of contraction of the great toe. Flexion of the ankle and eversion of the foot are well performed by the transplanted tendon.

CASE V.—Leslie E., aged fifteen years, entered Dr. Harte's service at the Orthopedic Hospital in November, 1906. At the age of seven years he suffered from an acute febrile attack, which left him with

partial paralysis of the right leg. Ever since, that is, for eight years, he has worn a brace. There is marked varus and cavus, with slight equinus. There is outward luxation of the head of the astragalus. There is atrophy of the calf, although some power of extension of the foot persists, but there is complete paralysis of the peronei.

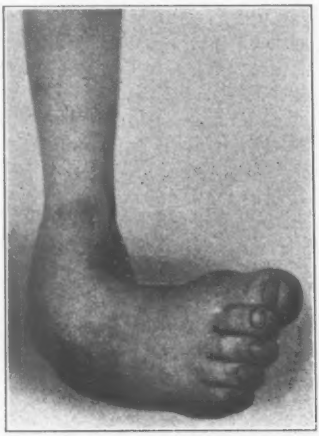


FIG. 6.—Case V. Paralytic varus of the right foot, before operation.

FIG. 7.—Case V. Paralytic varus of the right foot, after operation.

Without the support of the brace, he stands on the dorsum of the foot (Fig. 6). On November 11, the patient was etherized, the plantar fascia was cut, the arch was depressed with the lever, the varus was partly corrected by the varus machine, and the tendo Achillis was finally divided. The foot then came into the over-

corrected position only with great tension. Put up in plaster. The cast was removed November 29, and after receiving massage for a week or ten days, the patient was again etherized on December 14, and the foot was again stretched, very forcibly, with the lever, and over the triangular block. The projecting astragalus was thus mashed into place, and the foot assumed quite a normal appearance. The cast was left on until January 2. On January 16, 1907, the patient was etherized for the third time, and the tendon of the tibialis anticus was transplanted to the tuberosity of the fifth metatarsal bone. Owing to the greater size of the foot it was not deemed advisable to attempt subcutaneous division of the annular ligament as in Cases I and III, so an incision was made over the tibialis anticus above the annular ligament, the tendon was here drawn up (after separating it from its insertion through the first incision), and was thence drawn through a subcutaneous channel to the desired point of suture over the tuberosity of the fifth metatarsal bone. The tendon was sutured to the periosteum in this place by four chromic gut sutures. The time consumed was thirty minutes. The plaster cast was left on until February 9, when it was changed. The patient was now allowed to walk about the ward with his cast for a shoe. The cast was finally removed on February 28, more than six weeks after the operation. The transplanted tendon contracted firmly in its new position, and produced good flexion at the ankle, with eversion of the foot (Fig. 7). With a shoe having the outer side of the sole raised a quarter of an inch it is difficult to detect in the gait any limp except that due to the general atrophy of the right lower extremity, which is an inch shorter than the left.

Case VI.—Lizzie McQ., aged seven years, entered Dr. Davis's service at the Orthopedic Hospital, January 1, 1907. She had had an attack of poliomyelitis before she learned to walk. There was complete paralysis present of the tibialis anticus; and the peronei, the extensor longus digitorum, and the extensor longus hallucis all produced a fairly marked condition of valgus (Fig. 8). It was determined to transplant the peroneus brevis and the peroneus tertius into the tibialis anticus at its insertion. On January 25, 1907, an incision was made over the insertion of the peroneus brevis, and this was detached from the bone. An incision was then made above the external malleolus, behind the fibula, and the tendon of the peroneus brevis was drawn up. A third incision was made over the insertion of the tibialis anticus, and the tendon to be transplanted was drawn down subcutaneously to this point, where it was sutured with four silk sutures to the tibialis anticus (the foot being held in the calcaneovarus position), and with two other silk sutures to the periosteum of the scaphoid bone. Then an incision was made over the peroneus tertius, which was detached from its insertion and transferred subcutaneously across the dorsum of the foot to the inner side, where it was sutured to the tendon of the tibialis

anticus and to the periosteum with three silk sutures. The incisions in the skin were all closed with chromic catgut. The time of the operation was twenty minutes. A plaster cast was applied, and not removed until March 26, more than eight weeks after the operation. The transplanted tendons were found firmly united to

FIG. 8.—Case VI. Paralytic valgus of the left foot, before operation.

FIG. 9.—Case VI. Paralytic valgus of the left foot, after operation..

the tibialis anticus. By their contraction the arch of the foot is restored (Fig. 9), and the foot instead of being pulled by flexion into the extreme valgus position as was the case before the operation, is now flexed without appreciable deviation from the mid-line. The patient wears an ordinary shoe, and does not limp.

FURTHER REMARKS ON THE CARE OF GUNSHOT WOUNDS OF THE ABDOMEN.

WITH ESPECIAL REFERENCE TO THE TREATMENT OF WOUNDS OF THE URINARY BLADDER AND THE DANGER OF ABSCESS AND FISTULA FOLLOWING WOUNDS OF THE PANCREAS.

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Last year I[1] reported 14 cases of gunshot wound of the abdomen. Since that time I have had 3 more cases, which I desire to report with comments, as 2 of them were of unusual interest.

Case I.[2]—*Ten holes in the small intestine, two in the bladder; resection; permanent catheterization; recovery.*

W. H., a colored male, aged twenty-three years, a native of Maryland, a waiter by occupation, was operated on January 27, 1906, at the Emergency Hospital, four hours after having been shot. A 0.32 pistol-ball had entered the abdomen on the right side, one inch to the inner side of the anterior superior spinous process of the ilium. The condition of the patient was good; his pulse 96; he had vomited once, and had some pain in the bowels, but it was not very severe. Under ether anesthetization the abdomen was opened through the right rectus muscle, revealing considerable thin, bloody fluid, ten holes in the small intestine (ileum) and two in the bladder. The ten holes in the bowel were in a portion of bowel not over two feet in length, and four of the holes were in a section not over two inches long. Six holes were closed with silk sutures; the two inches of bowel so badly lacerated were resected and an end-to-end union made with silk sutures. One opening in the bladder was closed, but the other was so deep in the pelvis as to be inaccessible without opening the bladder and suturing it from the inside. Rather than do this it was decided to provide permanent drainage to the bladder, in order to prevent the escape of urine into the peritoneal cavity; this was done by putting into the bladder, through the urethra, a soft-rubber catheter and fixing it in position. The abdominal incision was closed, leaving a rubber drainage tube in the lower end of the incision. There was suppuration in the abdomen for about three weeks, when it ceased and the drainage tube was removed. The catheter was removed twice a week for cleansing and was left out permanently at the end of three weeks. The patient had no difficulty in urinating. He was permitted to get up March 1, thirty-two days after the operation, and was discharged recovered March 12.

[1] Amer. Jour. Med. Sci., February, 1906.
[2] Case XV, continuing the former series.

A skiagram showed the bullet on the left side, apparently just above the neck of the left femur. It was not disturbed.

CASE II.—*Nine openings in the small intestine, two in the bladder; operation twelve hours after injury; death.*

R. W., colored, male, aged twenty-eight years, was shot March 1, 1906, the ball entering the back near the spine, just below the left twelfth rib, and was operated on at Georgetown University Hospital March 2, about twelve hours after the injury. Pain did not come on for several hours after the shooting, but when seen twelve hours later the patient was in great pain. The abdomen was swollen and tender; he had passed bloody urine, had vomited once, and the pulse was 110. Under ether anesthetization the abdomen was opened in the median line, just above the pubes. At least three pints (1500 c.c.) of bloody fluid with a fecal odor was found in the peritoneal cavity, and peritonitis was well advanced, the intestines being distended, swollen, and many coils covered with lymph. Nine holes were found in the bowel, distributed through about the last seven feet of the ileum, and two in the bladder, one above the other, about one and one-half inches apart. All the holes were closed with silk sutures, the abdominal cavity was thoroughly irrigated with salt solution and closed with drainage, and a catheter was fastened in the urethra. The ball, 0.32 in calibre, was found loose in the bottom of the peritoneal cavity. Death from peritonitis occurred twenty-six hours later.

CASE III.—*Wounds of the liver, stomach, pancreas, and kidney; primary healing after operation, followed two months later by a second operation for abscess in connection with the pancreas.*

Mrs. A. K., a white female, aged twenty-five years, was shot June 25, 1906, and was operated on one and one-quarter hours later at the Emergency Hospital. A 0.32 pistol-ball had entered the epigastric region three inches below the ensiform cartilage and one inch to the left of the median line; it could be felt beneath the skin on the back, just below the last rib and three inches to the left of the median line. At the time of the operation the patient was in good condition, pain was not severe, the pulse was 100, the skin cool, and she had vomited blood. Under ether anesthetization the abdomen was opened through the left rectus muscle. A hole was found in the left lobe of the liver from which bleeding was still going on, and one in the anterior wall of the stomach. These were sutured at once, the liver with catgut and the stomach with silk. The lesser peritoneal cavity was then opened by bringing up the transverse colon and splitting the mesocolon, thus exposing the posterior wall of the stomach, in which another hole was found and sutured. A hole in the pancreas was sutured; beyond this the ball was not traced, but there can be no doubt that it wounded the left kidney, as the organ lay directly in the path of the bullet, and examination of the urine showed considerable blood which could not otherwise be

accounted for. No irrigation was used in the toilet of the peritoneum; the blood and clots were simply sponged out and the abdomen was closed without drainage. There was no trouble about healing, but the temperature and pulse continued above the normal. On July 27 the ball was removed under cocaine, but no sign of abscess was seen.

On August 25, two months after the operation, the patient was still not well, and during the last two or three weeks she had been getting worse. The temperature had not remained normal for more than a day at any time since the operation, usually ranging from 99° to 101°, the pulse 90 to 110, although she had been sitting up and walking about. Recently the temperature had been running higher, 100° to 103°, the pulse 100 to 120; there were no chills, but sweats were common, appetite was poor, constipation was present, and marked loss of flesh had occurred. Physical examination showed tenderness, swelling, and abnormal percussion note. It was thought that an abscess might be present, possibly due to the action of the pancreatic juice, and an exploratory laparotomy was done August 25. The abdomen was opened through the scar. Spider-web adhesions were found, but the wounds in the liver and stomach (anterior) were well healed. On lifting up the transverse colon a hard mass was felt deep in the cavity, behind the lower border of the stomach, bounded above by the pancreas, with which it was attached; to the outer side was the descending colon; to the inner side the inferior mesenteric vein showed prominently, while also to the inner side, below and in front, was the first portion of the jejunum, just after the intestine escapes from the ligament of Treitz. These parts were adherent, and on breaking up the adhesions a cavity containing about a tablespoonful of yellowish debris was discovered. The stomach did not appear to enter into the formation of the abscess. The broken-down material was wiped out and a rubber drainage tube was put in through a stab wound through to the back, where it was sewed to the skin. The incision in front was closed without drainage. Four days later the pulse and temperature were practically normal and remained so. There was only a slight discharge through the tube until the fourth day, when a large quantity of what looked like pus, and contained staphylococci, was discharged. The discharge continued for five weeks, when it ceased and the opening healed. It was collected in two or three days and amounted to seven ounces in twenty-four hours, and on being tested by Dr. J. F. Anderson, it gave all the reactions of pancreatic juice.

The first 2 cases show quite clearly the importance of early operation. The wounds were almost exactly alike in location and severity, but the one patient was operated on four hours, and the other twelve hours, after the reception of the wound; there was no evidence of peritonitis at the time of operation in the first case, but peritonitis was well under way in the second case and death resulted.

Another point of interest is the use of the catheter as a drainage tube for the bladder, to prevent the escape of urine into the peritoneal cavity when, for any reason, a wound of the bladder cannot be closed. I generally use it even in wounds of the bladder which have been completely closed, in order to prevent tension while the wounds are healing.

Case III is interesting on account of the pancreatic fistula and its resemblance to the wounds received by President McKinley, in which the bullet passed through the stomach and wounded the pancreas and left kidney, and was followed by the formation of an abscess in connection with the pancreas.

THE CAUSES AND TREATMENT OF STERILITY IN WOMEN.

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The treatment of sterility is mainly minor office treatment and has long been regarded as one of the most unsatisfactory parts of gynecological practice. That positive results cannot be promised is still true; unsuccessful cases are still met with, and always will be; yet, in point of fact, it is not nearly so discouraging as it has been considered. The subject usually has not been studied in sufficient detail, and the treatment of a given case is too frequently based on an insufficient study of the patient.

Of course, it must be premised at the outset that the fertility of a given marriage is dependent upon the condition of both of the two partners. There has long been a general impression that sterility is exceedingly rare in men and common in women, an erroneous conception which has led, and still leads, to much unnecessary and unfair treatment of perfectly fertile women; but it is as a result of this conception that it is usually the woman who presents herself for treatment.

It is probably true that sterility is somewhat more common in women than in men, and when the woman who comes for treatment presents some minor abnormality which might prevent conception, and which can easily be remedied by painless treatment, it is probably wise to apply such treatment for a reasonable length of time before questioning the condition of the husband; but no extended or uncomfortable treatment should be given, and certainly no operative work, even of a minor nature, should ever be undertaken without first establishing the fertility of the husband. Sterility in men is not, however, the subject of this paper and may, therefore, be dismissed with this preliminary proviso.

Sterility in women may be dependent on many possible causes,

the potential existence of each of which must be carefully weighed in each case, and, as will be seen, each case involves for successful treatment a careful clinical study of the whole genital system of the patient as a preliminary undertaking before any treatment is instituted.

One fact of the utmost importance, however, has been so generally overlooked as to require emphatic consideration at the very beginning of any study of this subject. Sterility in women may be dependent, as has been said, on many and very diverse causes, but, whatever the original cause may be, the immediate factor by which conception is prevented is, in the vast majority of remediable cases, an alteration of the secretions of one or another part of the genital tract of such a nature as to render them hostile to the ovum or the spermatozoa. We have then two points which are always of diagnostic importance. The clinical key to the diagnosis and treatment of any given case lies in the study of the secretions, but on the other hand it must not be forgotten that the determination of the lesion or condition which underlies any change of secretion is essential to its rectification, hence the necessity for the most careful inquiry into the condition of the entire genital canal at the beginning of every case.

The causes of sterility may be conveniently classified for analysis from a clinical standpoint as follows:

NOT EASILY REMEDIABLE. (*A*) Imperfect ovarian function; that is, ovaries which fail to produce a perfect ovum, capable of impregnation.

(*B*) Organic or functional imperfections of the tubes; that is, tubes which are incapable of transmitting the ovum to the uterus.

REMEDIABLE. (*C*) An inhospitable endometrium.

(*D*) Hostile secretions.

The subject of the treatment of the not easily remediable causes of sterility need be given but briefly here, since it has of late occupied much space in gynecological literature in the course of the discussion of the conservative surgery of the appendages. Certain general principles, however, must be summarized before we pass to a fuller discussion of the less familiar and much more easily remediable minor causes of sterility.

(*A*) OVARIAN IMPERFECTION. The existence of ovarian imperfection is usually clinically uncertain, whether in small, normal-sized, or enlarged ovaries, and is capable of positive proof in a given case only when the ovaries are exceedingly small, either from senility or from arrested development. Underdevelopment of the ovaries probably always implies underdevelopment of the uterus also, and its prognosis depends on its degree.

If imperfect function coexists with a normal-sized ovary it cannot be diagnosticated. The existence of a merely functional incapacity has not been definitely demonstrated, but that it does occasionally appear

is inherently probable, and this probably explains some of the otherwise unexplained failures of fertility in apparently normal women. It is a practical point that the possibility of this cause must always render the prognosis of a given case doubtful, especially in nulliparæ, but the more carefully our cases are studied the less frequently are we obliged to fall back upon this possibility.

Enlargement of the ovaries to a moderate degree is not necessarily a cause of sterility even though it be bilateral, as is shown by the many cases in which pregnancy has been observed to occur with somewhat enlarged ovaries and even in the presence of large ovarian neoplasms; that cysts of one or both ovaries may inhibit pregnancy has been conclusively shown, on the other hand, by the many reported cases in which the conservative surgery of moderately enlargd ovaries has been followed by conception in previously sterile women. In spite, however, of the large aggregate number of isolated successes which have now been reported, a wider study of the records of all conservative operations on the ovaries will convince anyone that the fertility of such women is well below par even after operation, that is, no large percentage of them ever conceive; and though want of space forbids an extended discussion of this subject, it may probably be laid down as a rule that the conservative surgery of the ovaries does not as yet offer a sufficiently good prospect of fertility often to warrant the opening of the abdomen for the treatment of small enlargements of the ovary on account of sterility alone, and in the absence of other symptoms. In other words, the value of such surgery lies rather in the possible preservation of fertility in women whose general ill health warrants operation, than in any hope of producing fertility in sterile women who are otherwise in good health.

(*B*) Imperfect Action of the Tubes. This may be dependent upon (1) organic stricture and (2) alterations of the mucous membrane.

1. *Organic strictures* are probably always inflammatory in their origin, and hence usually involve a coincident abnormality of the mucous membrane. They can be diagnosticated as present only when the existence of distention or adhesions is sufficiently marked to be palpable. Their treatment, of course, is purely operative, and the prognosis must depend upon the situation of the closure and the condition of the mucous membrane.

2. *Alterations of the mucous membrane* of the tubes are probably always inflammatory in one degree or another. That exceptionally they may be caused by disturbances of menstruation independent of infection is undoubted, but they are far more often the product of infection, obstetric or gonococcic. Their prognosis is always doubtful, but fertility is rare after an infection of the tubes has produced a palpable lesion. Their treatment apart from the operative management of closed tubes is wholly that of the management

of the acute stages of the inflammatory diseases of the tubes, and that of the endometrium, to be spoken of later.

(*C*) THE INHOSPITABLE ENDOMETRIUM. This subject, in its relation to sterility, resolves itself clinically into two divisons: (1) The results of infection, and (2) hyperplasia from chronic congestion without infection.

1. *Infection of the endometrium* almost always involves infection of the mucous membrane of the tubes, and therefore needs no further discussion here except to say that even in the comparatively rare cases in which spontaneous recovery from infection is so complete as to involve a possible restoration of function, restoration of fertility is usually inhibited by a hyperplasia due to the long-continued congestion which is a concomitant of the endometritis,[1] and the treatment is then that of hyperplasia from congestion.

2. *Hyperplasia from Congestion.* The chronic congestion which underlies this condition is probably always due either to some other abnormality in the genital tract or to constitutional conditions. Its successful treatment, therefore, is dependent upon a detection of the underlying causes of the congestion and upon their removal before any treatment of the hyperplasia as such is undertaken. The mere enumeration of all the causes of congestion of the uterus would manifestly open too wide a subject to be entered upon here, but it may be said that after the removal of the cause the hyperplasia itself will often persist and demand curettage.

The diagnosis of the minor conditions of the endometrium which render it hostile to the ovum or spermatozoa, and which, therefore, are causes of sterility, is, however, a subject of much practical importance, which has been much neglected, and which is essentially pertinent to the present paper.

From the standpoint of sterility this, which I have called the hostile endometrium, is then usually to be detected clinically by observation of the uterine secretion. In almost all of the easily remediable cases the actual bar to conception is found in an alteration of the uterine or vaginal secretions, or both, of such a nature as to be detrimental to the spermatozoa. The most hopeful and essential part of the treatment of sterility is to be found in the study of the abnormal conditions of these secretions, and their restoration to the normal, both by the removal of the causes of their alteration and also by direct treatment of the secreting surfaces themselves.

(*D*) HOSTILE SECRETIONS. Of necessity a knowledge of the hostile secretions presupposes a knowledge of their normal state, and of the conditions necessary to their functional efficiency, for the comprehension of which some knowledge of what their physiological functions are is in itself a necessity.

[1] The classification of the inflammatory conditions of the endometrium has of late become so confused by conflicting pathological views that I prefer not to enter into this subject in a clinical article even by implication, and have therefore limited myself here to the rather non-commital terms of endometritis and hyperplasia.

1. *Uterine Secretion.* All mucous membranes are moist and covered with secretions of varying characteristics. It is probable that the function of the uterine secretion is simply that of affording a medium through which the spermatozoa may pass to the ovum, and for this purpose its condition should be, as in the normal state it in fact is, that of a mildly alkaline albuminous fluid of very limpid consistency, somewhat scanty in quantity (insufficient for a perceptible flow from the os), clear, and so slightly viscid as to form a rounded drop without stringiness when withdrawn from the cervix.[2]

The secretion of a congested or simply hyperplastic endometrium is usually clear, alkaline, profuse, and somewhat increased in consistency over the normal; that of an endometrium which has been infected varies from cloudy to purulent and from viscid to semisolid; it is usually alkaline, but may be faintly acid. The normal alkalinity of the uterine secretion may be decreased even to neutrality by the constitutional conditions which lead to an overacidity of all the secretions, but an actual acidity of this secretion is rare.

2. *Vaginal Secretion.* The functions of the vaginal secretion are essentially different and, indeed, in part opposed to that of the uterine secretion. Its presence is not necessary or even favorable to the spermatozoa, which are normally deposited surrounded by their own fluid in contact with the os. It subserves the two functions of lubricating the vaginal walls, which are always more or less movable upon each other during the movements of respiration, defecation, etc., and of affording an obstacle against the infection of the mucous membranes of the uterus and tubes (and therefore of the peritoneum) by the introduction of bacteria from without. This function is of the first importance, both to the health of the individual and to the preservation of the race, and its bearing on our subject makes it worthy of some little exposition here.

The bactericidal properties known to be inherent in the normal vaginal secretion are probably twofold, consisting, first, in its normally acid reaction, and, second, probably, in the normal existence within it of bacteria whose activities are antagonistic to the existence, or at least to the virulence, of the pathogenic forms. The normal vaginal secretion contains two somewhat different components. It has been described by Döderlein and Williams as consisting of a small quantity of white material not unlike curdled milk or partly liquefied cream cheese, scanty in amount, and very acid in reaction; but these observers have evidently neglected, or neglected to state, the fact, patent to anyone who will look at the normal vagina, that the greater part of its secretion consists of a thin, clear, watery fluid

[2] Although some action of suction has been attributed to the uterus during coitus by numerous theorists, this somewhat fanciful theory is not founded upon any scientific basis, and is decidedly opposed to the little that we know of the process of impregnation in the lower animals. It is probable that the only method by which the spermatoza can reach the cornua is by their own natatory efforts, for which the existence of the uterine secretion is essentially necessary.

which is very moderately acid, very slightly slippery in consistency, and which should be present in sufficient amount to keep the vaginal walls moist, but not in amount sufficient to exude as fluid from the vulva. It is normally sufficiently scanty to dry from the labia as soon as it reaches the external air; scattered through this are small masses of the white, curdy material described by Döderlein, and accepted by Williams and others as the normal secretion of the vagina. This white material is probably always present, but is very scanty in the secretions of virgins, is always more abundant in patent vaginæ, and is present in profuse quantity in the secretions of pregnant women. As the observations of Döderlein and Williams, like those of most workers on the bacteriology of the vagina, were undertaken with especial reference to puerperal infections, and conducted for the most part on the secretions of pregnant women, the reason for their especial emphasis of the presence of this white material is sufficiently obvious, but it is in fact the less constant of the two elements of the secretion. It may possibly be the product of Bacillus lactiformans of Döderlein.

In spite of the extensive observations which have been made by Döderlein, König, Williams, and many others upon the bacteria of the vagina, our knowledge of its bacteriology is still but rudimentary, the whole subject being obscured by the habitual presence in it of a great variety of non-pathogenic species, in addition to which some of the observers have reported the presence of forms which would be considered pathogenic if they had not apparently lost all virulence. The only assured knowledge which we have is that which has been stated above, that it is bactericidal, and that this property is in part due to the presence and activity of non-pathogenic species, in addition to the inhibition offered by its acid reaction. This latter is probably the more important.

It is well known, to quote from Neumann, that "Most varieties [of bacteria] of practical importance, and all pathogenic varieties, prefer a medium containing albumin which is faintly alkaline in reaction." In connection with the acid-producing capacities of many bacteria a great amount of experimental study has been made upon the capacity of all the important species to withstand acid media, but since the degrees of acidity at which they reproduce themselves even sparsely are too slight to be easily detected by litmus paper and are consequently calculated by the quantity of a 1 per cent. alkaline solution necessary to neutralize a similarly prepared acid medium, while the normal vaginal mucous membrane stains blue litmus paper a moderate red, that is, shows it to be of a degree of acidity which makes an unpropitious if not impossible culture medium, it is evident that this acidity is in itself a bactericidal factor of the utmost importance; indeed, this has been admitted by all observers.

That the vaginal secretion possesses, however, a further bac-

tericidal action has been established by repeated experiments in which the pathogenic varieties failed to grow, or grew but sparsely and with loss of virulence, when carefully neutralized vaginal secretion was employed as the medium. Hewlett sums up the situation by saying, "There [in the vagina] we have a normal flora which may injure strange invaders, and the acid reaction is unfavorable to most pathogenic bacteria."

That the natural bars against infection, however, are not wholly efficient is shown by the facts that the gonococcus does not lose its vitality in moderately acid media, and that if other bacteria are introduced in sufficient quantity, or surrounded by enough alkaline fluid, they may retain their virulence long enough to reach the alkaline media of the uterine secretion. It would have seemed easy for evolutionary processes to have protected the all-important reproductive functions against infection more surely by the interposition between them and the external world of a more strongly acid, and therefore more bactericidal, vaginal secretion, were it not for the fact that the spermatozoa, like other protozoa, are incapable of survival in any but a neutral or faintly alkaline medium. It is therefore necessary to the function of reproduction that the vaginal secretion should be so moderate both in quantity and acidity as to be easily displaced or neutralized by the alkaline semen which surrounds the spermatozoa (it is well known that the use of a slightly acid injection immediately before coitus is one of the most successful methods of preventing conception), hence the evolutionary compromise that a vaginal secretion which shall act as a bar to infection[3] without preventing conception must be scanty in quantity and faintly acid; and, in point of fact, the existence of a profuse and improperly acid vaginal secretion is one of the most frequent and efficient causes of sterility. The acidity of the vagina is due to the presence of lactic acid, which is believed to result from the activity of Döderlein's (lactic acid producing) bacillus, a fact which is essential to our understanding of some of the factors in the treatment of the abnormal secretions for the relief of sterility.

The vaginal secretion may be altered from the normal in quantity, reaction, consistency, clearness, and color. Its variations in chemical reaction may be of constitutional origin or due to bacterial activity; it may be greatly increased in quantity without other changes by simple congestion; but all changes other than these two are probably due to the activities of bacteria, and are therefore the result either of an increase in the normal flora or of the introduction of pathogenic species.

Changes in the Secretions from Merely Constitutional Conditions. Acidity of the uterine secretion or the more common excessive acidity of the vaginal secretion is one of the most important

[3] The vagina, like all external canals, is constantly exposed to infection from without.

conditions from the standpoint of the relief of sterility, since, unimportant as it otherwise is, it is during its persistence necessarily prohibitive of fertility. It is the only change in the secretion which can be due to merely constitutional conditions, that is, which may be independent of local causes. It may be produced by any state which tends to acidity of all the secretions, and when the acidity of both secretions is increased without other changes the cause is always constitutional, but it must be remembered that even when it is in part of fermentative origin there may also be a constitutional element present, so that this must always be looked for. What that element may be is to be determined by a quantitative examination of the twenty-four-hour urine, which in such cases will always show an excess in the production of one or the other of the acid elements, and will thus indicate the dietetic changes which should be employed to produce a decreased acidity of all the secretions.[4]

Changes Due to Bacterial Activity. In addition to the always important changes in chemical reaction we must study the changes in the quantity, consistency, and color of both secretions, but more especially that of the vagina. The many observers who have worked upon the bacteriology of the vagina have usually confined themselves to the changes in the secretion which are produced by the presence of the pathogenic bacteria, and have therefore described only the normal secretion and the secretions found in cases in which the pathogenic species were found to be present, but it must be remembered that their work was founded mainly upon the puerperal discharges and was conducted throughout with especial reference to the etiology of puerperal infection.

From the standpoint of the study of fertility we must recognize clinically three states of the vaginal secretion: (1) The normal. A clear, serous secretion, moderate in quantity, faintly acid in reaction, and containing varying quantities of white, curdy material of very acid reaction. (2) A somewhat more profuse discharge, not distinctly purulent, but turbid, yellow in color, of greatly increased acidity, and usually, though not always, free from the presence of the normal cheesy material. (3) An abundant creamy discharge which may be purulent, seropurulent, or mucopurulent, and is usually in addition somewhat excessively acid in reaction.[5] This last form of discharge is always significant of the presence, or past presence of the pathogenic species, as has been established by numerous bacteriological observations, and usually affects both secretions. The other form is usually limited to the vagina and is probably significant of an overactivity of its normal flora, but this point has

[4] Excess in the use of common salt is a not uncommon cause of constitutional overacidity of the secretions.

[5] During the acute stages of a pathogenic infection the secretion is alkaline, but usually becomes acid as the virulence of the invasion passes off.

not yet been studied bacteriologically. This is a point well worthy of such observation, and I hope to be able to effect its accomplishment in the future.

To sum up, then, the changes which should be looked for in the secretions are:

(*a*) *Change in Both Secretions Simultaneously.* We may find both secretions changed together in the direction of overacidity, but without other changes; this is always constitutional overacidity. We may have both secretions changed together in the direction of increased quantity, but without other changes; this is the result of simple congestion. We may have both secretions changed together into a seropurulent, mucopurulent, or purulent discharge; this is always the result of an infection by pathogenic bacteria.

(*b*) *Uterine Secretion Normal, Vaginal Secretion Abnormal.* Since the uterine secretion is discharged into the vagina we never see the uterine discharge affected while the vaginal discharge is unchanged, but the vaginal may be abnormal without any change in the uterine secretion. This is either temporary, that is, the initial stage of an ascending pathogenic infection, or more or less permanent as a result of non-pathogenic bacterial action, that is, an excessive acid fermentation.[6]

Methods of Clinical Diagnosis of the Secretions. The vagina should be opened by a speculum before any other form of an examination is made, and without the use of a lubricant in introducing the speculum.[7] The quantity, color, and consistency of the vaginal secretion is now noted and its reaction taken. The vaginal walls and the vaginal surface of the cervix are then carefully cleansed with dry cotton, no solution being used for fear of changing the reaction. The appearance of the cervical secretion is then noted either by spreading the lips apart by tension on the vaginal walls with the speculum or by compression of the cervical canal between the blades of the speculum or between the anterior blade of the speculum and a pledget of cotton pressed by forceps against the posterior aspect of the cervix. The drop of cervical secretion so brought to the os is then tested with litmus paper (the litmus may if necessary be passed into the cervical canal by the forceps, but if this is done care must be taken not to excite bleeding, which will at once ensure a stronger alkaline reaction); the color of the vaginal and the cervical mucous membranes is noted and a careful bimanual

[6] The etiology of this change has not been definitely proved, but it is a fair working hypothesis that it is due to the presence of excessive quantities or unusual varieties of the non-pathogenic bacteria, *i. e.*, that it is an excessive acid fermentation of the vaginal discharges. It is certain, from clinical observation, that a yellowish and intensely acid vaginal secretion may be persistent for a long time without effecting any change in the uterine secretion.

[7] The introduction without a lubricant is rendered easy and painless to the patient if the labia are first drawn apart by an assistant so that the speculum does not come in contact with the dry external skin, but passes at once into the moist and slippery vagina. A small sized speculum should, of course, be used.

examination of the uterus, tubes, and ovaries is then made. The constitutional condition of the patient is canvassed and a twenty-four-hour specimen of urine is collected and sent for quantitative analysis. Not until all this has been done is an observer in a position to determine the cause of a sterility.[8]

CLINICAL TREATMENT OF THE HOSTILE SECRETIONS. The treatment of overacidity of constitutional origin is, of course, that of the constitutional condition present; its full discussion would occupy too much space to be entered upon here. It may suffice to say that after the determination of the elements of acidity by an examination of the urine, the appropriate diet and hygiene should be selected experimentally, and tested and modified by repeated quantitative analyses of the urine. It is not infrequently connected with the excessive ingestion of salt, as evidenced by an excess of chlorides in the urine.

The treatment of excessive quantity of the secretions due to congestion is, of course, that which is likely to remedy congestion. When sterility is due to this cause it will occasionally happen that a mere depletion of the pelvic organs by glycerin, preferably in the form of suppositories inserted each night for some weeks, will result in conception, but more often it is necessary to remove permanently the congestion by the detection and treatment of the lesion or condition which causes it.

When a congestion is dependent upon a retroversion, new-growth, or other gross lesion of the organs, the accompanying sterility is usually only one of the symptoms for which the patient seeks treatment. An elaborate discussion of such cases would manifestly cover almost the whole field of gynecological practice; but the existence of congestion without apparent lesion is usually indicative of an abnormality in the functional use of the organs. Sexual perversion I believe to be extremely rare, at all events among the women whom I have been called upon to treat. In a somewhat extended experience I have seen but two instances of it, and both of them were cases of psychical rather than practical perversion. Self-abuse I believe to be rare among women, but numerous abnormalities of desire, such for instance as the capacity for excitation with but little if any power of relief by obtaining the orgasm, I know to be extremely common and a most fertile cause of congestion of the pelvic organs. The results of these abnormalities of function in the production of neurasthenia, pelvic pain of the neurasthenic type, etc., form a subject of much interest and importance which for obvious reasons has been seldom or never written upon, and into which it is not my present purpose to enter. I must content myself here with expressing my belief that he who would successfully treat sterility must be equipped with some knowledge of this subject, and in spite of its

[8] The conditions under which the fertility of the husband should also be investigated have been already referred to.

disagreeable features should not hesitate to enter upon it if he would do justice to his patient, whenever he believes that the sterility for which he is consulted is the result of an otherwise unexplained congestion; this is the more especially true if the patient has acquired or increased a neurasthenia since marriage.

A purulent or semipurulent condition of both secretions is always the product of a pathogenic infection. Neither the acute or subacute stages of such an invasion comes properly within the province of a paper on sterility, since during those stages the patients consult us for symptoms of the acute infection, and it is only after their subsidence that the question of the resultant sterility comes up clinically. The majority of such infections leave behind them one of the lesions of the tubes or of the endosalpingium which have been referred to above, and this point must always be considered in the diagnosis of the chronic cases; it is only those which progress more favorably which concern us here.

During the acute stage the secretions are usually actively purulent; during the resolving stages, which cover weeks, months, or more often years, the secretion which issues from the os changes gradually through a seropurulent to a mucopurulent condition, and the attack resolves itself finally to a condition in which the secretion is composed of a very evident semisolid, stringy mucus, around which a thinner, viscous, and more abundant cloudy fluid exudes. In most such cases the semisolid mucous plug is cervical in its origin, while the thinner fluid comes from the corporeal endometrium.

Even in cases in which no definite lesion of the tube is left, the prognosis for fertility is always doubtful, yet the percentage of such cases in which fertility is possible is sufficient to warrant the institution of a moderate amount of treatment for sterility in favorable cases, even in the absence of other symptoms, provided the patient is willing to submit to it with the understanding that its issue is doubtful.[9]

The first step in the treatment of such cases consists in the generally somewhat tedious process of disposing of the cervical plug, and the first and most important point in this process lies in ensuring the freest of drainage from the cervix. The cervical canal is frequently somewhat dilated by the thick mucus which it contains, and no permanent recovery can be expected unless the external os is larger than the canal above it. The shape of the canal should be carefully studied out with the sound, and if there is the least constriction of the external opening this should be enlarged on each side laterally with scissors before any other treatment is undertaken (the little

[9] During the seropurulent condition local treatment of the endometrium of any kind is more likely to result in reinfection and reënlargement of the tubes than to do any good. During the stage in which the discharge is still mucopurulent the advisability of local treatment is very doubtful, and it should be used with great caution. It is only after the thoroughly chronic stage has been reached that local treatment should usually be permitted.

snips are painless and may be made without anesthesia). The mucus should then be thoroughly removed from the cervical canal with a dull curette and the surface carefully wiped out with a powerful disinfectant such as iodophenol (tincture of iodine 1 part, crude carbolic acid 2 parts), and this process should be repeated at short intervals until the stringy mucus is no longer formed. These applications are to be directed against the cervical canal alone and should not be allowed to pass through the internal os; but if after the cervical discharge has been rendered approximately normal, that is, no longer semisolid, the uterine discharge is still clouded and overviscous, the patient is in condition for a curettage. This should be as thorough as possible, should be preceded by a dilatation of the cervix so complete as to ensure permanently free drainage, and should not be followed by packing of the uterus. Disinfectant applications to the corporeal endometrium are seldom wise, but the curettage should be preceded and followed by the thorough relief of congestion and the maintenance of the best drainage by continued care of the cervical canal. Success in the management of these difficult cases usually involves also the consideration and care of all the possible complicating causes of sterility, both local and general.

Even when an abnormal uterine discharge is due to lesions of the upper genitalia, the vaginal discharge is soon affected by contact with it; hence the rule that an abnormal uterine discharge of necessity implies a similar vaginal affection, which should be subjected to treatment simultaneously. The converse of this rule, however, is not always true, and those cases in which only the vaginal discharge is affected, though often obstinate, usually yield in the end a very large percentage of success. When the vaginal discharge is of the type to which I have given the provisional name of fermentative, that is, abundant, acid, and yellowish, but not purulent, while the uterine secretion is normal, the frequency of easy relief by antifermentative treatment lends some support to the provisional hypothesis that this form of change is due to an overactivity of the normal flora.

This form of abnormality is always remediable by thorough and repeated disinfection of the vagina; but a great deal of experience in its treatment has convinced me that while this statement is most definitely true, a clinically adequate performance of the disinfection involves an extreme attention to detail, and is seldom accomplished satisfactorily in less than from six to twelve treatments, repeated at intervals of two to three days—it may require more. One detail, which I believe to be especially essential to effective disinfection, is that the vagina during treatment should be so thoroughly distended that the crevices between the rugæ should be thoroughly exposed, and the rugæ themselves as nearly as possible effaced. This involves in most cases a thorough loosening of the garments about the waist and the assumption of the knee-chest position. The dis-

infectant used should be one which, without excoriating the vagina, is capable of penetrating the superficial epithelium. The text-books on pathology tell us that the vagina is liable to an exfoliative vaginitis in which the superficial epithelium is cast off in a thin eschar which may sometimes be detached in the form of a more or less complete cast of the vagina, and that this condition may be produced by the use of many antiseptic and astringent agents; they do not tell us what the vendors of nostrums have long known, that the separation of these eschars of a mild exfoliative vaginitis is not necessarily attended by any excoriation of the surface, but leaves behind it when produced by most reagents a normal and clean-looking vaginal mucous membrane. A preparation which was at one time exceedingly widely sold was an example of a nostrum which, though not very valuable, achieved its popularity by the mental impression produced by the expulsion after its use of such a cast of the vagina—of course in connection with the highly colored statements as to its nature, which were published with the remedy. The word eschar, however, is overdescriptive of the exfoliation produced by the milder reagents. I was for long uncertain whether it was anything more than a coagulation of the vaginal mucus, but I have become convinced that, which ever it is, it is harmless and an index to an efficient disinfection of the infected vagina.

The technique which, after trying many substances, I have found most effective is, after putting the patient in the knee-chest position and exposing the vagina with a Sims speculum, to dust its walls thoroughly with powdered protargol, through a powder blower, in such quantity that the powder adheres to the wall of the vault over its whole surface; a pledget of dry absorbent cotton is then placed against the powdered surface, the speculum is slightly withdrawn, and the surface which is newly exposed by its withdrawal, as well as those which have been wiped clean by the passage of the cotton, are repowdered, until by a repetition of the process the entire vaginal wall has been covered with the antiseptic. The patient is directed to return at the end of forty-eight hours. She is again placed in the knee-chest position and the cotton is removed, when if the protargol has been thoroughly used, the greater part of the vagina will be covered with a thin, grayish membrane, which can usually be wiped from the surface by the gentle use of absorbent cotton. This eschar is too superficial to be harmful; it will usually be absent from some parts of the vagina, and will perhaps at others be too adherent to be easily removed; no effort is made to detach the latter, but the dressing of protargol and dry cotton is repeated precisely as before, and the process is repeated at intervals of two or three days until the discharge has become scanty and colorless. Aristol is then substituted for the protargol for one or two succeeding treatments, and after an interval of a week or less without treatment the secretion is reinspected and tested for acidity. If it is normal it is reinspected at

intervals of a week or more, since the yellow color and overacidity are not infrequently reproduced after an interval without treatment, but they are then usually easily overcome by comparatively few applications. In the absence of an alteration of the cervical discharge, that is, in merely fermentative vaginitis, again to coin a term, this treatment rarely fails to be effective, and permanently effective.

Sterility in women may be due fundamentally to any one of many causes, but almost invariably, if not always, the mechanism of the production of sterility is by a change in the secretions. Its relief is always dependent upon the restoration of the secretions to the normal, but this can rarely if ever be brought about unless by the complete relief of the underlying condition which has caused the change in the secretions.

A vague comprehension of the mechanism by which sterility is produced as a result of the underlying lesion and the merely empirical treatment which is too often applied to it have long caused the subject to be looked upon as one of the opprobia of gynecology. A thorough diagnosis of the whole condition of the patient and more especially of her genital system as a whole at the beginning of the case, and a willingness on the part of the patient and the attendant to pursue care in subsequent treatment into minute detail, will not yield uniform success, but it does raise its percentage to a point at which the treatment of sterility becomes a satisfactory part of practice. At least a fairly accurate prognosis of the percentage of chance for each individual patient can usually be made and submitted to the patient at the beginning of the treatment.

THE INFLUENCE OF TUBERCULOUS ANCESTRY ON THE PROGNOSIS IN PULMONARY TUBERCULOSIS.

By Karl von Ruck, M.D.,
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For centuries the opinion has been generally held that heredity exerts a very important and unfavorable influence on the transmission of, and the prognosis in, pulmonary tuberculosis. So firmly was this idea established that any member of a family, in which tuberculosis had occurred even remotely and who contracted the affection, was often believed to be hopelessly doomed. Thus Morton[1] considered that the disease in hereditarily predisposed subjects was fatal in most cases, the underlying cause not being within the reach of the medical art. In more recent literature this view is still prevalent. Jaccoud[2] divides phthisis into three forms, one of which

[1] Phthisiologia, etc. Francofurti et Lipsiæ, 1691, p. 151.
[2] The Curability and Treatment of Phthisis. English by Lubock, New York, 1885, p. 30.

is the hereditary; and this form, from the mere fact of its being hereditary, offers the least prospect for recovery. Yeo[3] makes one of the conditions for cure "the absence of hereditary taint." Ribbert[4] thinks that children with a tuberculous ancestry are not only more disposed to infection, but that the severity of the resulting disease is conditioned by the degree of this predisposition. In further support of this idea Williams[5] shows, from the records of 460 patients, that a definite family history considerably increases the gravity of the prognosis. Of 374 patients who were discharged more or less improved only 29.03 per cent. showed a family history of tuberculosis, while of 86 patients who were not improved, or who had grown worse or had died, 65.03 per cent. had a history of tuberculosis in their families. Riffel[6] asserts that in families in which both parents have a hereditary predisposition, the mortality in most cases is greater than in those in which only one of the parents is so predisposed. In the latter case it makes no difference whether father or mother is affected.

While it thus may happen that tuberculosis appears to be a family trait, and that the disease appears to be "handed down" as it were, from parent to offspring, occasionally perhaps passing over one, or even two, generations, such a history does not *ipso facto* make the existing disease more serious. In fact Reibmayr,[7] although insisting upon the hereditary transmission of the disease, holds that a specific resistance is acquired by the descendants of the tuberculous ancestors which increases in the course of generations and eventually amounts to immunity against the pathological tendency.

For some time various observers have come to the conclusion that the existence of hereditary predisposition being granted, this factor need not necessarily darken the chances for a cure, and that indeed, it might even be a favorable factor in the prognosis. Flick[8] is one of those who deny the influence of heredity from an etiological standpoint and believe in a transmitted partial immunity. Weicker[9] recalls that Meissen was the first one thus to point out that patients with hereditary predisposition are not at a disadvantage in point of the improvement aimed at, as compared with those without hereditary predisposition. This view is also supported by Turban[10] and by Rumpf.[11] The results obtained in enduring improvement by Turban and by Weicker were as follows:

[3] Brit. Med. Jour., vol. i, 1892, p. 106.

[4] Ueber Vererbung, Marb. Akad. Reden, 1902, No. 6, p. 25.

[5] Diseases of the Chest, London, 1903, p. 10.

[6] Mitteilungen über die Erblichkeit und Infektion der Schwindsucht. Braunschweig, 1892, p. 181.

[7] Die Ehe Tuberkulöser und ihre Folgen, Leipzig and Wien, 1894, pp. 60 ff.

[8] Jour. of Tuberculosis, vol. i, 1899, No. 4, p. 187.

[9] Tuberkulose–Heiltaetten–Dauererfolge, Leipzig, 1903.

[10] Beitrage zur Kenntniss der Lungentuberkulose, Wiesbaden, 1903, p. 147.

[11] Schroeder and Blumenfeld, Hdb. d. spec. Ther. d. Lungenchwindsucht, Leipzig, 1904, p. 477.

Turban: without hereditary predisposition, 44.8 per cent.; with hereditary predisposition, 49.6 per cent.

Weicker: without hereditary predisposition, 41.1 per cent.; with hereditary predisposition, 46.6 per cent.

Weicker concludes that these patients enjoy a relative degree of immunity, and supports his conclusion by further statistics, from a study of 3299 cases with the following percentages:

			Able to work.	
	Predisposed. Per cent.	Not predisposed. Per cent.	Predisposed. Per cent.	Not predisposed. Per cent.
Cured . . .			64.5	62.0
Improved . .	86.5	81.2	16.4	15.0
Not improved .	11.8	15.3	7.5	9.9
Grown worse .	1.5	2.7	11.4	12.3
Died	0.2	0.8	0.2	0.8

King[12] believes that there is a certain degree of immunity conferred on the children of phthisical parents. He offers the statistics of 242 cases of pulmonary tuberculosis to sustain his opinion, and he shows that tuberculosis occurring in the parents, or a tuberculous family history, not only has no adverse prognostic influence, but that a certain degree of immunity is transmitted from parent to offspring, and he concludes that hereditarily predisposed subjects of phthisis show a sufficiently increased resistance to the progress of the disease to justify him to accept as true a transmission of partial, although not a sufficiently protective, immunity and an increased tendency to recovery.

Turban[13] further shows that when both parents were tuberculous, lasting improvement occurred in 50 per cent. Rumpf[14] has also found that heredity is not a bad factor in the prognosis. He concludes, however, that it will be better for the purpose of prognosis to consider the degree of resistance, rather than the origin of the infection. Cornet[15] considers the clinical results equal for both classes. Solly[16] concludes from his investigations that, with certain exceptions, a family history of phthisis offers no worse, and perhaps a little better, prospect of recovery.

That there may be an increased resistance to tuberculosis in the descendants of tuberculous families, as Reibmayr has suggested, appears to have some confirmation by the results which Petruschky[17] claims from treatment with tuberculin; he states that 54 mild cases, mostly in families with hereditary predisposition, had all practically recovered.

Reibmayr[18] is perhaps the most extreme supporter of the idea of

[12] Med. Record, vol. lx, 1901, p. 565, and Trans. Brit. Congr., 1901, London, 1902, vol. iii, p. 641.

[13] Loc. cit.

[14] Loc. cit.

[15] Die Tuberkulose, second ed. Wien, 1907, p. 469.

[16] Trans. Am. Clim. Assoc., vol. xi, 1895, p. 9.

[17] Kriterien und Kontrolle der Heilung bei Lungentuberkulose, 1903.

[18] Loc. cit.

an acquired and transmitted immunity. According to him patients, with one or both parents tuberculous, are not worse off than those whose parents were healthy, for, he says, "the more thorough the tuberculization in the progenitors, the greater is the resistance to the disease in the offspring." He holds, that the disease is transmitted by a specific virus, while at the same time there occurs a transmission of specific resistance. This specific resistance or immunity becomes the more marked and obtains the more rapidly in tuberculous families, and in races and nations, according to the length of time that tuberculosis has been prevalent among them, and according as they intermarry closely, or are isolated geographically; the Jews and people living on islands, as for instance the English, have, for the reasons stated, acquired the greatest resistance. According to the degree of inherited resistance he divides all tuberculous patients into four groups:

1. *Resistance Low; Prognosis Almost Uniformly Fatal.* The course of the disease in the individuals in this group is more acute, the tendency to recovery is slight. Periods of abatement are short, and therapeutic measures are almost without avail. As a rule, there are many children in the families, premature labors and abortions being frequent. The mortality in children is great, especially during the first years of life. Of ten to twelve children in one family only few grow up, and although these may reach maturity, yet in the end they die of tuberculosis. These latter represent the more resistant members of the family and the duration of their lives depends upon the attention paid to the laws of hygiene.

2. *Resistance Slight.* Childhood mortality is great, but the children live longer than in Group 1. Still they die usually before the tenth year of their age (the few more resistant ones surviving),of scrofula or tuberculosis of the bones and joints. In all cases there is a tendency to abscess formation. Affections of the lungs and pleura are frequent. The survivors, being more resistant, may reach fifty years of age under a hygienic mode of life, but they mostly die between the twentieth and thirtieth year, and as a rule of tuberculosis, or of purulent pleuritic exudates or pneumonia. Those reaching adult life suffer much from bone and joint tuberculosis of the fungoid form. The tendency to abscess formation persists, and indeed predominates. The course of the disease is more chronic than in Group 1. Recovery is still rare; relapses are the rule. Tuberculosis of the lungs still predominates; the tendency to suppuration is well marked.

3. *Resistance Moderate.* The number of children born in this group is less, and deaths under ten years of age are less frequent. While in the preceding groups the scrofulous affections of childhood are torpid, in the present group they are of the erethic type; the children have an anemic appearance; nervous disturbances are more in evidence; there is less tendency to suppuration and a more marked

tendency to recovery from glandular, bone, and joint affections. If suppuration occurs, recovery is rapid. The lungs in members of this group are more resistant, apex catarrhs, and apex infiltrations are still frequent, but the tendency to recover predominates. Individuals reach an age of forty, fifty, or sixty years, and they die less frequently of tuberculosis than those of Group 1 and 2.

4. *Resistance Complete.* The inherited immunity manifests itself to such a degree that, unless it be lowered by an unhygienic mode of life or by other causes, individuals do not acquire tuberculosis. The adults in this group are neurasthenics, but attain a greater age. Their children continue to resist tuberculous infection, unless a union with a non-immune person again reduces the hereditarily transmitted protection.

Reibmayr was not the first to express this idea of an acquired immunity. Rindfleisch[19] declared in 1881 his view, that tuberculosis was inherited like syphilis and that it was at one time a similar infection, only perhaps even more malignant. He thought that by its great and general extension, the whole human race had become permeated with the specific poison which in time had produced a certain degree of immunity.

The statistics published by the German Imperial Health Bureau (Hamel[20]) give data from which the influence of an hereditary predisposition on the prognosis may be estimated, and from their examination I find that 2150 patients (both sexes) were discharged as cured. In the cured cases a history showing the ascendants to have been tuberculous was given, positively in 486 cases (22.60 per cent.), and probably in 588 cases (27.35 per cent.).

Of the remaining 2566 patients (both sexes) who were discharged as not improved, or as having grown worse, the history showed tuberculous ascendants positively in 540 cases (21.05 per cent.), and probably in 611 cases (23.81 per cent.). Taking the "positively" and the "probably" tuberculous ascendants together, we have of the 2150 cured patients 1074 (49.45 per cent.), giving a history of tuberculous ancestry, whereas a like history was shown in 1151 (43.29 per cent.), of 2566 patients, who failed to improve. This shows a difference of 6.16 per cent. in increase of frequency of tuberculous ascendants for the former.

A study of the records of the last 1415 cases treated at the Winyah Sanitarium showed a history of tuberculous ancestry in 487 (31.11 per cent.). In 768 cases discharged apparently cured a history of tuberculous ancestry was recorded in 248 (32.16 per cent.); of 255 cases in the first stage, 80 (31.37 per cent.); of 357 cases in the second stage, 108 (31.20 per cent.); and of 156 cases in the third stage, 60 (39.46 per cent.). In 559 improved cases a history of tuberculous ancestry was recorded in 186 (31.50 per cent.); of 27 cases in the

[19] Virchow's Archiv., vol. lxxxv, 1881, p. 71.
[20] Tuberkulose-Arbeiten., Berlin, 1904 to 1906.

first stage, 8 (29.91 per cent.); of 239 cases in the second stage, 77 (32.62 per cent.); and of 293 cases in the third stage, 101 (34.47 per cent.). In 187 cases that failed to improve, or grew worse, a tuberculous ancestry was recorded in 47 (25.13 per cent.); of 10 cases in the second stage, 2 (20.00 per cent.); and of 177 cases in the third stage, 45 (25.42 per cent.).

Taking the 1327 cured and improved cases together, with a tuberculous history in 434 (32.63 per cent.), there appears a difference in frequency between these and the 187 cases in which no improvement resulted, of 7.50 per cent. in favor of hereditary influence from a prognostic standpoint.

It will be seen that the comparative statistics in the cases observed in the Winyah Sanitarium do not differ materially from those supplied by Turban, Weicker, Hamel, and King, and they support the views of Solly, Petruschky, Cornet, and others, who do not believe that a tuberculous ascendancy in itself clouds the prognosis in phthisis. The combined observations deal, however, with too small numbers, and the differences shown are not great enough to accept Reibmayr's extreme position, so elaborately set forth by him in his interesting monograph.

In any case the study of this question is extremely involved and difficult, and requires the consideration of many other influences which affect the course of the disease in the individual patient. In our cases, we have only extended the study to the different stages of the disease, but have not taken into consideration the age of the patient, the particular form of the disease, the presence or absence of tuberculous or other complications, the duration of treatment, and other physical and personal features, which existed and undoubtedly varied greatly in the cases as they are grouped. Such studies, it is hoped, will be undertaken hereafter.

For the present, it is at least comforting to have shown that the indications point in favor of the view that the mere fact of a tuberculous family history being shown in an individual case will not diminish the patient's chances of recovery, and that we may thus not only comfort some of this class of patients and their friends, but also by removing their fears of being at a disadvantage or perhaps doomed to the same fate which had previously overtaken their parents and other relatives, cause them to make more determined and better sustained efforts for their own recovery.

PATHOLOGY OF ADENOIDS AND ADENOID TUBERCULOSIS.[1]

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Although the clinical conditions associated with adenoids and enlarged tonsils are now widely recognized, the pathology of these overgrowths is not fully understood. In the present paper I have attempted to summarize some of the views recently advanced concerning the pathology of these tissues, especially as to their relation to tuberculosis. The subject has been investigated in connection with the study of a series of adenoids primarily with a view to determining the incidence and significance of tuberculosis in these tissues. In these examinations evidence of tuberculosis has been the main object of search, but I have taken the opportunity to note the general histological features which have been the subject of comment by other observers.

The material was obtained from the Nose, Throat, and Ear Department of the Royal Victoria Hospital. Seventy-five adenoids were examined histologically, and in 12 cases this was supplemented by the inoculation of guinea-pigs. In many cases the faucial tonsils were also carefully examined. The study does not represent a consecutive group of cases, as too much material was available and the work was interrupted on several occasions; on the other hand, it is not selective, except in regard to a few of the cases used for inoculation. The examination has been thorough in each case, and I feel that the findings represent a fairly accurate estimate of the incidence of tuberculosis in the cases studied.

Cases of Adenoid Tuberculosis. In 5 cases histological evidence of tuberculosis was found; in 4 of these the disease was clinically primary in the adenoid, in the fifth the adenoid was probably involved secondarily to a pulmonary focus, and in this case the faucial tonsils were also affected. The percentage of primary adenoid tuberculosis found was thus 5.3 per cent. The notes of these cases, together with the one of secondary involvement, are as follows:

Case I.—Male, aged nine years; adenoid removed February, 1905.

Case II.—Female, aged eighteen years; adenoid removed November, 1905. These 2 cases are very similar as to history. Both gave a family history of tuberculosis, but showed no physical signs of tuberculosis either before or after operation (report from family physician, October, 1906). Sections of the adenoids showed typical tubercles with giant cells and caseation (Figs. 1 and 2). Tubercle bacilli were not demonstrated.

[1] Read at a meeting of the Montreal Medico-Chirurgical Society, February 15, 1907.

CASE III.—Male, aged seventeen years; adenoid removed November, 1905. A history of family tuberculosis, and of hip-joint

FIG. 1.—Adenoid tuberculosis (Case II). Confluent tubercles with abundant giant cells and caseation. (No. 3 objective.)

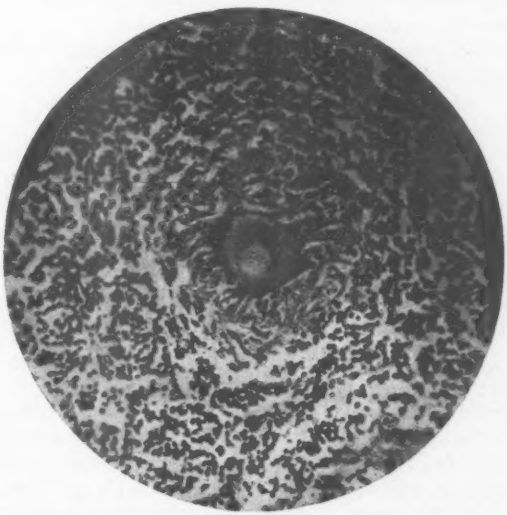

FIG. 2.—Adenoid tuberculosis (Case II). Central giant cell surrounded by a zone of epithelioid cells showing defective staining reaction. At the lower part the edge of a neighboring tubercle is seen. (No. 6 objective.)

disease in childhood at age of six years (healed). At present in rubust health and free from signs of pulmonary tuberculosis—before and after operation (examined October, 1906). Sections of adenoid showed typical tubercles (Fig. 3).

CASE IV.—Female, aged nineteen years; adenoid removed January, 1906. Caseous gland at the angle of the jaw on the left side; otherwise free from signs of tuberculosis, and in robust health. Adenoid showed definite tubercles (Fig. 4), but the tonsils showed no sign of involvement. Subsequent history beyond a few weeks is unavailable, but at that time the patient showed no sign of pulmonary involvement.

In these 4 cases the diagnosis of *primary adenoid tuberculosis* has been made (on clinical evidence).

CASE V.—Male, aged twenty-six years; adenoid removed March, 1906. Had a large mass of caseous glands in the left cervical region. Though there were few physical signs of lung involvement, he had a marked tracheitis and slight elevation of temperature. After operation he developed active pulmonary tuberculosis. The adenoid and tonsils both showed tubercles. Diagnosis—secondary adenoid and tonsillar tuberculosis.

SUMMARY OF INOCULATION EXPERIMENTS. The number of guinea-pigs inoculated was 12; 5 died of sepsis; of the remaining 7, 2 were inoculated with adenoid showing histological tuberculosis. No guinea-pig developed signs of tuberculosis. It seems likely that either the virulence of the infection was not sufficient to overcome the guinea-pig's resistance, possibly an obsolete tuberculosis, or that since the foci were discrete and scattered a non-tuberculous portion was inoculated.

THE PATHOLOGY OF ADENOIDS. In discussing the pathology of the adenoid and enlarged tonsils the features which I wish to emphasize are those bearing on the interrelation of the tonsillar tissues and the general health and well-being of the individual: (1) The causes of tonsillar enlargement, and (2) what is known of the function of these tissues which, under certain conditions, may become important channels of infection.

Attention must first be drawn to the fact that the amount of lymphoid tissue normally present in the pharynx is extremely small and analogous to the lymphoid tissue of the small intestine, Peyer's patches. As Bosworth[2] has pointed out, the conventional tonsil of anatomists is really an hypertrophied one and no more normal than an enlarged lymph node elsewhere. On this same ground Jonathan Wright[3] objects to the use of the term "function" in connection with these tissues, for, he maintains, this implies a normal condition of the organ or tissue studied. Of course, most of the tonsils studied by various observers were probably hypertrophied beyond even the

[2] Trans. Amer. Laryng. Assoc., 1901.
[3] New York Med. Jour., 1900.

degree popularly considered normal; in the present series all were hypertrophied. What modification this may cause in their function is yet to be determined.

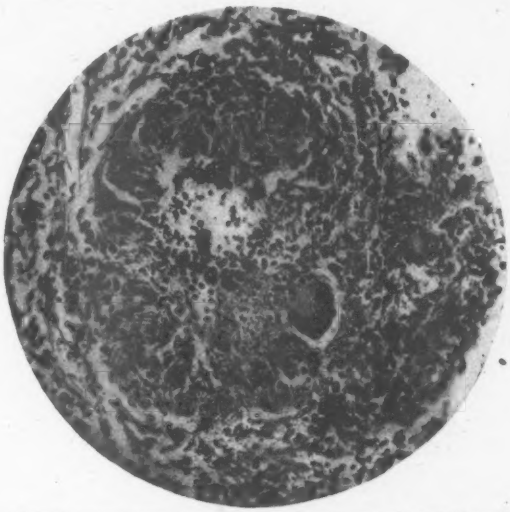

FIG. 3.—Adenoid tuberculosis (Case III). Giant cell and epithelioid proliferation, caseation, and infiltration of the central portion. (No. 6 objective.)

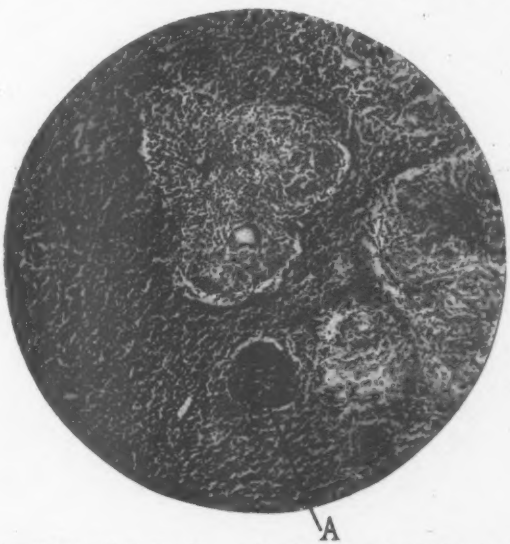

FIG. 4.—Adenoid tuberculosis (Case IV). *A*, lymph follicle or germinal centre. The paler areas are tubercles with early caseation. (No. 3 objective.)

ADENOID AND TONSILLAR ENLARGEMENTS. *Histology.* The microscopic appearance of an adenoid or an enlarged tonsil is that of a true hyperplasia, the lymphoid cells being numerically increased. The amount of connective tissue varies to a considerable extent and does not seem to bear any relation to the age of the patient.

Fibrosis was marked in 30 cases of the present series; it was slight or absent in 45 cases. The majority of the cases with fibrosis occurred in the first decade, but marked cases were found in the older subjects. McBride and Turner[4] suggested that the fibrosis frequently seen in adenoids might become a cause of atrophy, but this has not been demonstrated. As Nicholl and Lartigau[5] point out, adenoids which show more or less marked atrophy often lack fibrosis, while others, in which fibrosis is marked, tend to persist. As to the cause of atrophy we know very little, but from the number of adenoids met with in adults, we now know that it is not so constant as was formerly thought.

McBride and Turner[6] point out that atrophy is often inferred from the relief of symptoms as the patient gets older, but that this relief is due rather to the growth of the pharynx making the obstruction relatively less marked than to any true atrophy of the adenoid. It must be emphasized that the most lamentable sequels of adenoids, such as faulty nasal development and chronic nasal or Eustachian catarrh, occur early, during the period of active growth, and that often the adenoid may atrophy only after the harm is done.

The epithelium covering the adenoid is generally columnar, but it is often of transitional or squamous type. In the present series the prevailing type was columnar in 36 cases, squamous in 29, and about evenly mixed in 10 cases. A striking feature of the covering is a rarefaction and lymphoid infiltration of the epithelium. This seems to be constant in the crypts, and very common on the surface as well. This condition has long been commented on and is so extreme at times as to suggest a complete loss of covering. On careful examination, however, the remains of the epithelial cells and the basement membrane can be made out. This change makes the deeper tissue more accessible to invasion by the loss of the mechanical and other protective influences which a healthy mucosa afford. Ewing[7] seems to regard this as an invasion on the part of the lymphoid tissue. Some observers have regarded this condition of the mucosa as evidence of an epithelial origin of lymphocytes. In my opinion it represents merely a chronic inflammatory change in the mucosa, the generative activity of the epithelial cells being directed toward repair rather than to the formation of lymphocytes. A somewhat similar condition is to be seen in the mucosa of polypoidal turbinate bodies. Fig. 5 shows an extreme grade of infiltration of the mucosa and a tuberculous area

[4] Edin. Med. Jour., 1897, i.
[5] AMER. JOUR. MED. SCI., 1902.
[6] Edin. Med. Jour., 1897, i.
[7] New York Med. Jour., 1897.

immediately beneath it, indicating a successful penetration by the tubercle bacilli.

THE CAUSES OF ADENOID AND TONSILLAR ENLARGEMENTS. The causes of the lymphoid hyperplasia may be divided into two groups: (1) Constitutional, or predisposing, and (2) local, or exciting. Of these, the predisposing causes are regarded as much the more important.

As regards the frequency of adenoids in Montreal, Birkett[8] in 10,000 cases seen in private practice, found 1605 with adenoids, or 16 per cent. Of course, this percentage is of persons with nose, throat, or ear symptoms. Among persons otherwise healthy Meyer[9] found that of 1000 cases 1 per cent. had adenoids, and Chappel[10]

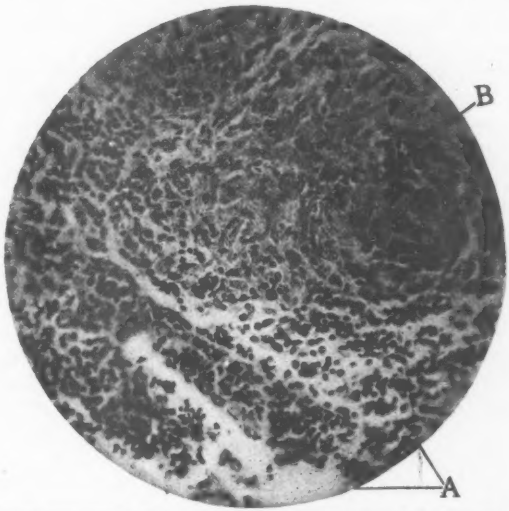

FIG. 5.—Adenoid tuberculosis (Case II). *A*, marked infiltration of the mucosa *B*, tubercle with marked epithelioid proliferation and beginning caseation. (No. 6 objective.)

found adenoids in 3 per cent. of 2000 New York school children examined. Sex does not appear to exert any influence.

The age of occurrence in the majority of cases is between the third and fifteenth year. For a short period the greatest number of cases in Birkett's series occurred between the third and fifth year. They are frequently met with up to the twentieth year, and occasionally much later. Cases have been reported in which the condition was found at, or shortly after, birth, but this must be rather rare. Nicholl and Lartigau, in 100 cadavers examined in the New York Foundling Hospital, found no adenoids present under one year.

[8] Posey and Wright, Diseases of Nose, Throat, and Ear, vol. ii.
[9] Quoted by Nicholl and Lartigau.
[10] Quoted by Nicholl and Lartigau.

This is the more significant when we consider that the type of child in such an institution is one specially liable to these growths, as shown by the great frequency with which they are found between the third and fourth years.

Heredity seems to be an important factor. In Birkett's series there were fifty-three families with two to four children affected. Tuberculosis, syphilis, gout, alcoholism, and old age in the parents, are mentioned as predisposing causes. The acute infectious fevers are also mentioned as antecedents of importance, but Gradenigo[11] states that although adenoids are supposed to follow these conditions, he has not been able to confirm the view by observation. McBride and Turner point out that such cases have seldom been examined for the presence of adenoids. These may have been present before the illness which has merely aggravated the symptoms and thus drawn attention to them.

Hertoghe[12] came to the conclusion that adenoids are a constant symptom in myxœdema, and that those subjects who show adenoids have at least a predisposition to thyroid disturbance. This has not been accepted, and it has been pointed out that their presence has either been a coincidence or is to be explained on the basis of a common etiology, for adenoids occur commonly in districts where thyroid disturbances are very rare.

A view mentioned by Osler[13] and many American writers, is that the enlargement is probably dependent on a disturbance of the general lymphatic system closely allied to, or a mild type of, lymphatism or status lymphaticus. Ewing has published an interesting paper on this condition and its clinical associations, such as rachitis, various anemias, hemophilia, disturbance of the thyroid, and hypoplasia of various organs. He points out that the common factor of importance appears to be a greatly lowered vital resistance from inherited or acquired influences.

This furnishes a common basis of explanation for the very varied etiology and associated conditions—tuberculosis, syphilis, old age, or other conditions in the parents, or an acute illness in the child, being regarded as acting not in any specific way but merely by lowering the general vitality. Friedländer[14] mentions this view as explaining some of the enlarged lymph nodes met with in childhood in other situations. The local causes are regarded merely as contributory and are the various conditions leading to irritation or congestion. Such are, recurrent attacks of acute inflammation, congenital smallness of the pharynx, or some unhealthy condition in the nasal passage or mouth. Local tuberculosis is regarded by most authorities rather as attacking an adenoid already present than as being a cause of enlargement. In many cases no definite cause can be discovered. In certain

[11] Die Hypertrophie der Rachentonsille, Turin, 1901.
[12] Royal Acad. de Med. du Belique, 26 Mar., 1898. (Quoted by Gradenigo.)
[13] Pratice of Medicine.
[14] Arch. Ped., 1902.

cases, contrary to the popular impression, puberty marks a period of increased growth rather than of atrophy.

THE FUNCTIONS OF THE TONSILLAR TISSUES. The earlier writers confined their notice to the faucial tonsils, which was only natural considering the prominent site of these in the pharynx. There seems to have been a popular belief that they had some obscure relation to the genital apparatus, but this does not seem to have ever been seriously advanced. A more academic view was that they secreted mucus to lubricate the food bolus in its passage down the gullet. As soon as histological studies were made, it was pointed out that they were essentially lymphoid in nature, the mucous glands present being connected with the mucous membrane covering it, not part of the tonsil proper. They resemble very closely in structure the ordinary lymphatic gland or node. This demonstration was important in two ways—it classified the tonsils as part of the general lymphatic system, and it led to the grouping of all the lymphoid collections of the pharynx as part of a whole, namely, the tonsillar ring of Waldeyer. This unity has been shown to be not only histological, but also functional. The function of the tonsillar ring may be conveniently considered from two points of view: (1) As regards the activities arising from the nature of its tissues, and (2) as regards those activities associated with location and environment.

The functions of lymphoid tissues are not wholly understood. They are known to be centres of growth for lymphocytes and hyaline mononuclear lymphocytes (Metchnikoff's macrophages). A better recognized function of the lymph glands or nodes is that of filtration of the lymph. They seem to act as sentinels, stopping, or in any case giving warning, of harmful invasion by the afferent lymphatics. Hingston Fox,[15] in 1885, pointed out that far from being secreting organs, the tonsils are really absorbents, and that their spongy structure penetrated by crypts is designed to give a large absorbing surface.

This absorptive function of the tonsillar ring has been established by experimental and clinical observation. Goodale[16] demonstrated the absorption of carmine particles injected into the tonsillar crypts, and Hendleshon[17] independently showed that similar absorption took place when particles were blown upon the adenoid. Wright[18] found a similar absorption of soot particles in adenoids removed from children that had been living in the smoky atmosphere of Pittsburg. Hodenpyl[19] thought that the tonsils had little power of absorption, but his findings do not agree with those of other observers.

The importance of this demonstration arises from the possibilities it opens up of infections of all kinds arising in the pharynx. Ruffer[20] found that absorption of bacteria went on in the tonsils of healthy

[15] Jour. Anat. and Phys., 1885.
[16] Archiv f. Laryng. and Rhin., Band vii., Heft 2 (Quoted).
[17] Ibid., Band viii., Heft 3 (Quoted).
[18] AMER. JOUR. MED. SCI., 1904.
[19] Ibid., 1891.
[20] Brit. Med. Jour., 1890.

animals, the presumption being that they were destroyed without injury to the host. This absorption of bacteria without infection of necessity following, has been recognized as occurring elsewhere, especially in the Peyer's patches, and has modified the views generally held with regard to all infections. The matter has been discussed by Adami[21] under the title "Latent or Subinfection."

In this connection many authorities, notably Gallois,[22] attribute the constitutional symptoms of adenoids to the absorption of various bacteria or their products from the nasopharynx. Boulay and Heckel[23] make the statement that the cases formerly classified as scrofulous or strumous, may now be divided into three groups: (1) The definitely tuberculous; (2) the syphilitic; and (3) the subjects of adenoids, holding that this latter group will account for all cases not included in the other two. They point out that the degree of *adenoidism* in such cases is not at all proportionate to the size of the growth, but depends entirely on the amount of absorption from it. Their views are worthy of attention and furnish a satisfactory explanation of the rapid and marked improvement so often seen in the patient's general condition after an adenoid operation.

The clinical lesson to be learned from all this is that in all cases of cervical adenitis the nasopharynx should undergo careful examination as a probable source of infection. If an adenoid be present it should be removed as a preliminary to other treatment. It is a common experience to have an adenitis of long standing disappear completely after the removal of adenoids or enlarged tonsils. Many of these cases clinically resemble tuberculous adenitis, but are probably only a prolonged irritation of the glands by continued absorption of the various mouth organisms of low virulence.

In acute general infections the tonsillar ring is now recognized as an important channel, and Ullman[24] has collected a large series of cases in which tonsillitis and sore throat have been followed by general infections, such as articular rheumatism, endocarditis, pleurisy, etc., without any other apparent source of infection.

Goodale[25] has discussed the local pathology of these systemic infections. An invasion by a pathological germ is met in the adenoid or tonsil by a local inflammatory reaction similar to that occurring elsewhere. Systemic infection may take place through the lymphatics or blood stream. Infection is favored by the presence of irregular crypts or pockets resulting from previous inflammation or shrinkage of the tonsil. Goodale[26] has recently emphasized this, and points out that question of removal of such a tonsil is to be decided, not at all by its size, which is the popular criterion, but by the presence of irregularities or recesses interfering with good drainage.

[21] Jour. Amer. Med. Assoc., December, 1899.

[22] La scrofule et les infections adenoidiennes, second edition, 1905. (Quoted by Boulay and Heckel.[23])

[23] Archiv. Internat. de Laryng. et Otologie, 1906. Nos. 2 and 3.

[24] Med. News, 1901.

[25] Trans. Amer. Laryng. Assoc., 1902.

[26] Boston Med. and Surg. Jour., September 13, 1906.

TUBERCULOSIS OF THE ADENOID AND TONSILLAR TISSUES. The opinion formerly held that the tonsil and adenoid were rarely affected with tuberculosis, has been shown to be incorrect, though as yet statistics differ as to the frequency and importance of their involvement. This change of opinion has resulted from a more careful and more thorough examination of the tissues. As the type of tuberculosis found is usually proliferative, rather than destructive, the clinical and macroscopic examinations are of little value and the methods of diagnosis are histological examination, inoculation of animals, and examination of sections for the tubercle bacilli.

For an indisputable diagnosis all three methods should have a positive result, but, owing to technical difficulty this is often impossible. It is generally accepted that a typical histological picture is sufficient to establish the diagnosis; that the existence of histologically typical tubercles is to be accepted as proof positive of the presence of the disease; and that the converse proves nothing, that is, absence of tubercles does not surely indicate absence of the tubercle bacilli.

Lewin[27] experimented with tuberculin as a method of diagnosis, but found it unsuitable. He got a severe reaction in many cases, in which the adenoid was not found tuberculous after removal. This is explained by the presence of other latent foci, especially in the peribronchial glands.

An important distinction is to be drawn between the two classes of cases of adenoid or tonsillar tuberculosis, the primary, and the secondary. The primary are such as present no sign of tuberculosis elsewhere which might have been the source of infection, and it is with this class of case that I am chiefly concerned.

The frequency of primary adenoid tuberculosis has varied remarkably in the experience of different observers. McBride and Turner, with histological examination, found 3 cases in 100 examined (3 per cent.), but they considered this too low. Dieulafoy,[28] using inoculation, found 7 cases in 35 examined (20 per cent.); Pluder and Fisher[29] with histological examination, found 5 in 32 cases (15.6 per cent.); Nicholl and Lartigau, by histological and inoculation examination, found 12 in 75 cases (16 per cent.). Wood[30] collected 1671 cases, examined by various methods, and found 88 cases of tuberculosis (5.2 per cent.). This corresponds to the work of Lewin, who found 10 in 200 cases (5 per cent.). In the present series of 75 cases, 4 (5.3 per cent.) were regarded as primarily tuberculous.

Primary adenoid tuberculosis is of importance as a latent focus of tuberculosis not recognizable clinically, which may lead to an infection of the cervical glands, or even to a more generalized tuberclosis. The result of operation in the primary cases is favorable in every

[27] Frankel's Archiv f. Laryng., 1899. (Quoted by Gradenigo.)
[28] Bull. de l'Acad. de Med., Paris, 1895. (Quoted.)
[29] Archiv. f. Laryng. and Rhin, 1896, Band iv. (Quoted.)
[30] Jour. Amer. Med. Assoc., 1904.

way. The site of operation heals as usual. The benefit of removing such a focus is apparent, provided always the focus be primary.

The interest lies not so much in the result of any individual case, as in the demonstration of a primary invasion at this point in the respiratory tract. Although opinion has been strong as to the importance of this channel of infection the amount of positive evidence has been small.

Secondary cases are those which arise in persons with pulmonary tuberculosis, or active tuberculosis elsewhere, and which are regarded as infected by the medium of the sputum or blood stream. This is of interest chiefly as demonstrating the readiness with which tubercle bacilli are taken up by the tonsils when present on the surface. Formerly thought uncommon it has been shown to be very frequent. Walsham[31] examined the tonsils in 34 subjects dead of pulmonary tuberculosis; in only 2 had there been anything to attract attention to the tonsils during life, yet in 20 subjects they were found tuberculous. Wood has collected 136 such cases, including those just mentioned, 94 (69 per cent.) being found tuberculous.

From the frequency of these secondary deposits, it is generally held that before a case may be regarded as primary, the patient must remain free from signs of pulmonary tuberculous for at least a year after removal of the tuberculous adenoid. Cases have been reported of patients, previously regarded as healthy, developing signs of pulmonary tuberculosis shortly after removal of the tonsils and adenoids. The explanation usually given of these cases is that an early or latent focus was already present in the lung at the time of operation, though perhaps escaping notice. The anesthetic and shock of the operation in these cases have probably been sufficient to stir up the activity of the disease. Apart from those in the lungs other foci are not likely to be sources of infection for the adenoid, unless a general dissemination with miliary tuberculosis occurs. The presence of a tuberculous focus elsewhere does not exclude an independent primary infection of the adenoid.

Adenoids and Tonsils as Channels of General Infection in Tuberculosis. The importance of the tonsillar ring as a channel of infection in tuberculosis is determined primarily by the relation which these tissues bear to the tuberculosis so commonly present in the cervical glands. Watson Cheyne[32] considered the infrequency of adenoid or tonsillar tuberculosis as strongly against this channel, and quoted the work of Delepine and Younge[33] to support his view. These observers examined the tonsils of 17 cases of tuberculous cervical adenitis, but did not find any of them tuberculous. He pointed out that, if such absorption goes on, the cervical glands should be very often involved in pulmonary tuberculosis in which the tonsils are bathed in sputum more or less laden with tubercle bacilli. He

[31] Channels of Infection in Tuberculosis. Weber Parkes, Prize Essay, 1903.
[32] Brit. Med. Jour., 1899. [33] Quoted by Moore.

regarded this as uncommon. Walsham, however, has investigated this latter point with a vastly different result. In 27 cases of pulmonary tuberculosis, he found at autopsy evidence of tuberculosis in the cervical glands, 26 times; the one negative case was one of fibroid phthisis. He points out that the impression of their infrequent involvement must have been based on clinical or macroscopic examination.

Moore[34] interprets the negative findings of Delepine and Younge quite differently to Cheyne. He regards the absence of tubercles in the tonsils as a sign of failure on their part to react to the infection. He regards this failure to react as evidence of an abnormal patency or "vulnerability of the channels of infection." He regards the finding of tubercles in the adenoid or tonsil as favorable, in so far as it implies an attempt to check the spread of the infection.

The experimental evidence has been clearly in favor of the tonsillar route. Baup[35] induced an experimental tuberculosis of the cervical glands in rabbits by inoculation of the tonsils, usually without a thoracic or abdominal tuberculosis. Wood produced a similar result in hogs. He states that in his opinion, in 90 per cent. of cases of tuberculous cervical adenitis the channel of entrance has been through the adenoid or tonsils. In so far as the cervical glands are concerned, opinion is fairly uniform as to the importance of this channel of entrance. Of course, it is recognized that other channels, such as carious teeth, are to be remembered, and also the possibility of an ascending infection from the peribronchial and mediastinal glands, but these are considered much less frequent.

When we attempt to estimate the importance of this channel in systemic tuberculosis, we find the matter becoming more dfficult and opinions differing widely. It is now recognized that the tubercle bacillus can be taken up without leaving any trace of its passage at the point of entrance. For this reason the matter cannot be reduced to the form of a definite demonstration; there must always remain a certain amount of inference and therefore possible doubt.

The channels of primary systemic infection, which are regarded as of the most importance, are four, given in the ascending order of importance: (1) By the blood—fœtal infection from a diseased placenta; (2) inoculation—by a wound in the skin; (3) by the digestive tract—following the ingestion of tuberculous food, or of tuberculous material introduced into the mouth by the fingers, especially in young children; and (4) by the respiratory tract—following the inhalation of tubercle bacilli with dust. At present we are only concerned with the last mentioned, namely, inhalation.

The present views as to the mode of infection by inhalation are entirely different to those at first advanced in favor of this route. The

[34] Jour. Path. and Bact., 1900.

[35] Les Amygdales Porte d'entree de la Tuberculose, Paris. (Geo. Carre and Co., 1900; quoted by Wood.[30])

idea that the bacilli are inhaled into the lung proper is debated, and the peribronchial glands are now regarded as the primary active focus; it is believed that the lungs or pleural cavity are invaded either by direct extension or by spread along the lymphatics of the lung against the lymph current. The frequency of tuberculosis of the peribronchial glands requires mention only to emphasize it. Northrup[36] in 125 autopsies on tuberculous patients at the New York Foundling Hospital, regarded the infection as primary in the peribronchial glands in 88 cases; in 34 cases the primary site was indeterminate, and in 3 cases in the mesenteric glands. Bovaird[37] collected 75 additional cases from the same source, in 60 of which the primary focus was peribronchial and in 15 indeterminate. It has long been recognized that these nodes are also the common site of latent or obsolete tuberculosis in the adult. Loomis[38] examined the peribronchial nodes of 30 adults dying of acute illness or accident while in apparent robust health, and found that in 8 cases they set up tuberculosis in a rabbit. In these cases there was at autopsy no sign of tuberculosis, past or present.

The point requiring further study is the channel by which the bacilli reach the peribronchial glands. We may conceive of the penetration of the bacilli occurring at any point between the entrance to the nostrils and the bronchi. Experimentally it has been shown that such infection may occur even from the nasal passages. Renshaw[39] introduced tuberculous material into the noses of guinea-pigs without mechanical injury and was able to produce systemic infection through the cervical glands. In no case was the spread to the meninges.

Boulay and Heckel have declared themselves strongly in favor of the view that this penetration takes place in the nasopharynx. They point out that persons of that type of physique, long regarded as especially predisposing to tuberculosis, having the long narrow chest and the characteristic facies, will generally be found to be the subject of adenoids, past or present. They regard the absorption of the tubercle bacilli as occurring, not especially through the adenoid, but from an unhealthy mucosa anywhere in the nasal passages or pharynx; the adenoid, however, presents conditions particularly favorable to such invasion. They call attention to the increasing frequency with which primary tuberculous conditions have been noted in the nose and nasopharynx since the development of rhinology has brought this region within the scope of clinical diagnosis, and in their opinion the lack of autopsy evidence is due to want of routine examination of the nasal chambers at autopsy. They lay stress on the frequency with which pulmonary tuberculosis is preceded by a history of chronic catarrhal inflammation of the nose and throat, with or without an accompanying cervical adenitis. They point out that in certain

[36] New York Med. Jour., February 21, 1891.
[37] Ibid., July 1, 1899.
[38] Medical Record, 1890, vol. ii, p. 689.
[39] Jour. Path. and Bact., 1901, p. 142.

individuals pulmonary tuberculosis is preceded by a fairly long premonitory period during which, in their opinion, the infection is confined to the glandular system, the rhinocervicomediastinal chain, and that much may be done at this period by treating any possible channel of entrance in the upper air passages, especially an adenoid. They write, of course, on the hypothesis that the nasopharynx is the main channel of infection in pulmonary tuberculosis. It must be remembered, however, that the conditions of the pharynx they describe are usually associated with catarrhal inflammation in the trachea and bronchi, which renders these regions equally open to invasion if infection be presenst; the exposure to infective material, however, is not so great. In nasal respiration the conditions are such that air-borne particles are not likely to penetrate beyond the nasopharynx. It has been shown experimentally that when a current of air is deflected by a moist surface its bacterial contents are deposited on that surface. The deflecting surface in nasal respiration is the nasopharynx. In mouth breathing, the chances of air-borne infection reaching the trachea or bronchi are somewhat greater. An adenoid or nasopharyngeal catarrh may in this way be an indirect cause of invasion in certain cases.

A general dissemination with acute miliary tuberculosis may follow the invasion of the cervical glands, but this is a relatively infrequent event.

Conclusions. 1. Primary tuberculosis occurs in a certain proportion of all cases of adenoids. From the figures of other observers, and my own, this seems to be about 5 per cent. This is regarded as a conservative estimate.

2. In determining the presence of adenoid tuberculosis the histological method is the most satisfactory.

3. Tuberculosis does not appear to be an important factor in the production of adenoid hypertrophy.

4. Adenoids and tonsils are the important channels of infection in tuberculosis of the cervical glands.

5. In the development of pulmonary tuberculosis adenoids may sometimes be direct channels of infection, but their importance is probably more often indirect by predisposing to catarrhal inflammations of the upper respiratory tract.

I wish to express my thanks to Dr. Birkett for the opportunity of doing this work for his department, and for his constant encouragement during its progress; and to Dr. Adami for the opportunity to work in the pathological department and for his advice in preparing this paper. I must also thank Dr. Keenan for his advice and assistance in the pathological work. The photomicrographs were prepared by Mr. Wootton.

CONGENITAL LARYNGEAL STRIDOR.

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Congenital laryngeal stridor has been the subject of many articles, mostly of European source, and of much discussion; the opinions as to its cause are almost as various as the number of observers. It was first described by Rilliet and Barthez, in 1853. In 1877, Krishaber reported 4 cases which existed from birth. The English writers were the earliest to trace its pathology and make the picture complete as it is accepted today. Lees, in 1883, was the first to report an autopsy and show with a plate his finding. In 1884 Gee reported 12 cases of noisy respiration, but the clinical picture given is not always that of a typical case. Politzer in the same year saw a case which he thought arose from vagus irritation, because of noise; he also thought the expiration divided into five or six staccato parts. The absence of dyspnea puzzled him greatly. He gave origin to the nervous theory which has largely obtained to the present time. Then followed cases by Goodhart, Lori, Suckling, Robertson, Smith, Semon, McBride, Variot, Refslund, Sutherland and Lack, Avellis, Herzfeld, Moure, Guinon, Comby, Thomson and Logan Turner, and others. An observation of my own is as follows:

A boy, three weeks old, was seen by me, July 10, 1903, because of a peculiar crowing sound made on inspiration. This noisy breathing was continuous, and accompanied at times by marked cyanosis. It began shortly after birth and went on without any free intervals, causing great distress and much loss of sleep to the parents. To all appearances the child was healthy, with the exception of the efforts made by it to obtain air—which were shown by the inspiratory depression of the jugulum and supraclavicular and infraclavicular fossæ, and also by the marked action of the chest. There was no sign of respiratory arrhythmia. The noise was of a crowing, guttural character, and could be heard through two rooms. The cry was normal. He is the fifth child. The family history is excellent. All the other children are healthy.

It was difficult, without an anesthetic, to examine the child with a mirror, owing to the smallness of the parts. Ether was administered, a mouth gag inserted, and a suture put through the tongue which rendered it easy to insert the mirror and see the parts. The epiglottis showed its lateral edges much incurvated, or rather rolled on themselves, so that the lateral edges and the aryepiglottic folds approximated very closely. A small rhomboidal opening could be seen at the base of the epiglottis, which was bounded by part of the lateral borders of the epiglottis and the anterior part of the

aryepiglottic folds. It was impossible to see the vocal cords because of the overlying position of the epiglottis on this rhomboidal opening. No external enlargement about the neck or of the jugulum, which would suggest enlarged thymus or thyroid, could be observed.

When about three months old the cyanotic attacks began to disappear, and chest deformity of a marked character became a prominent feature. The costosternal articulations became prominent, and the muscles of the chest somewhat over-developed, giving the appearance of a strong full chest. The marked action of the chest was also noted, and efforts made in inspiration still continued, as shown by the depression in the jugulum and the epigastrium. The sound still continued uninterrupted. When the child was a year old there was apparently little change, except in the tone of the sound, which had become rougher and of a deeper quality. The child looked extremely healthy. Once or twice it had slight colds which lasted for a few days but had no effect on the sound or its character.

When eighteen months old, the child was again examined; the action of the chest was less marked, but still gave the impression of extra effort. The sound was much less marked except on exertion, when its old character would return, but the breathing was always accompanied by a slight stridor. It was now observed that when the child fixed its attention the stridor entirely disappeared, but only for a moment. It was also observed, at this time, that the child's lower jaw did not occlude properly, there being a recession of fully half a centimeter. The child, however, did not breathe through the mouth. When two years of age, the child was examined with a mirror; the epiglottis still retained its peculiar shape, but the interior of the larynx could be seen well. The vocal cords acted normally the tendency of the aryepiglottic folds to approximate was still present. The recession of the jaw was more marked, and the muscles connected with it appeared tense. A slight sound still persisted, but under excitement it would return with some of its old character.

ETIOLOGY. Many theories have been advanced as to the cause of this stridor. The first is that of Rilliet and Barthez, that it is due to an inflammation or compression of the trachea, but only one of their cases approaches the real picture of the disease. Lori, of Buda-Pest, followed with a unique theory of clonic spasm of the glottis. He based this opinion on a laryngoscopic view, wherein he claims to have observed the cords pressing against one another. Robertson also favored the nervous origin of the trouble, and thought that adenoids set up a reflex disturbance affecting the abductors. Thomson and Logan Turner favor the nervous theory. They state that the spasm lasts a second or two, and accompanies almost all of the child's inspirations. Sutherland and Lack state that it cannot be

definitely decided that the vocal cords play a part, for in some cases there is not an abductor paralysis. Further, it was seen in older patients that the cords moved well and were fully abducted. Yet in these cases stridor occurred on exertion or during a quick inspiration and was invariably associated with a falling inward of the ary-epiglottic folds. The nervous theory receives a fatal blow in that the affection persists for months, even during sleep and anesthesia.

Thomson and Turner believe that it is due to ill coördinated spasmodic action of the muscles of respiration, that is, a choreiform respiratory spasm analogous to stammering. They show that the respiration of all young infants is peculiar, in being irregular in rhythm and force, as if the coördination involved in its movements was not under control. These often occur with sudden respiratory efforts, as for example, when a young baby is excited it is likely to make a crowing noise with inspiration, although it does not do it at other times. When coming out of chloroform anesthesia a similar stridor is observed, and a very loud crowing noise is a common accompaniment of operations on the genital organs, due to sudden inspirations which stimulation of nerves of these parts is likely to occasion. Along with the crowing there is also an indrawing of the lower chest wall proportionate to the loudness of the sound. Thomson and Turner conclude that there is a backward development of cortical structures of the brain, which in turn allows incoördination of respiratory movements. They claim that the deformity of the epiglottis is merely an exaggeration of the infantile type and due mainly, if not entirely, to suction of the upper aperture produced by the incoordinated respiratory movements, or, as they call it, stammering respiration. They claim there is no proof that congenital malformation of the larynx exists in these cases. Gay's statement on laryngismus stridulus, to the effect that this is caused by central irritation in children "or better to a deficiency of the higher centres," supports their theory. They hold it is analogous to other coördination neuroses, such as "writer's cramp." Sutherland and Lack oppose this theory of the developmental deficiency of the cortex, their observation showing that the children affected with stridor respire in the same manner as healthy children, that is, with the coördinated and spasmodic type. They also oppose the view that the crowing noise of chloroform anesthesia is due to the same cause as the stridor, because this occurs in adults under similar circumstances.

The adenoid theory was held by many. E. Smith reported 2 cases. The first snored from birth, but this disappeared on operation. The second, which was probably a genuine case, persisted for twelve days after the operation and returned at the end of a year when the child took cold. McBride does not think these cases belong to the genuine stridor group. E. Clarke operated on a patient but the stridor persisted. Variot had a similar experience.

It has been held by some that the sound is produced by tracheal stenosis, caused by enlarged thymus or by enlarged mediastinal glands. The thymus theory was strongly advocated by Avellis, who states that Allen Burns early in the last century thought the thymus a cause of tracheal stenosis and even suggested an operation for it. Siegel had a case which he erroneously diagnosticated as diphtheria. No result followed tracheotomy until the short tube was removed and the long one inserted. The latter caused decubitus. It was then realized that the thymus might be the cause, and Rehn proceeded to carry out Burn's suggestion and opened the mediastinum, lifted the thymus upward, and stitched it to the fascia of the neck. The trouble disappeared. F. Koenig had a like experience by partially removing the thymus.

Avellis speaks of Glockle's observation of 3 cases of stridor which terminated fatally as the result of enlarged thymus. Weigert could demonstrate the compression of the trachea in 1 of these cases. Avellis urges in favor of the thymus theory: (1) The age of the child; (2) cure in the second year; (3) congenital appearance; (4) increased by movement; (5) periodic stopping of the stridor when the position was changed; (6) negative laryngeal examination; (7) high position of the larynx; (8) air current in one bronchus stronger than in the other; and (9) operative results.

Stamm believes the thymus a cause. Hochsinger, of late, has investigated this with the *x*-rays, but his pictures were not looked upon with favor by Ganghofner, under whose suggestion he worked. Siegert also said that often when a large thymus existed he did not observe any stridor and related a case in which enlarged thymus existed without stridor. Thiemich suggests starving the child to produce shrinkage of the thymus, whereupon the child would lose the stridor were this the cause. This treatment has not been followed. Feer, of Basel, observed a case of enlarged thymus with stridor. Hochsinger states that enlarged thymus can exist without stridor.

Tatschner, in an article in answer to Hochsinger, refutes his statements. The patient was his own child, and he showed that by pulling the chin forward the sound disappeared. Whenever he held the child's attention for a minute either by calling it to pronounce words or checking its voluntary activity stridor stopped. It would invariably return, however, when he resumed his play.

As can be seen from the foregoing, the thymus theory is not sufficient, because: (1) The will has no power over the turgescence of an organ controlled wholly by an involuntary innervation. (2) Hochsinger himself admits that in many of his cases, in which he determined excessive hypertrophy, no stridor existed. (3) The *x*-ray picture was proved but once by autopsy. (4) Pulling the chin forward affects the position of the thymus gland, thereby increasing the compression which produces stridor. (5) The stridor observed in compression of the trachea is not inspiratory alone, but is both inspiratory and expiratory.

The case used by Avellis to support his theory, the case of Siegel and Rehn, had sudden attacks of dyspnœa night and day, and was diagnosticated as laryngismus stridulus by M. Schmidt. No specific stridor is mentioned, such as one finds in true congenital stridor. This case was in my opinion a true case of thymus hyperplasia. The child was two and one-half years old when seen, had no history, but began to cough when four or five weeks old. Avellis quotes Schmidt as seeing a patient who "snapped the air," but this has never been observed in true stridor. The attacks of coughing producing cyanosis and suffocating signs are seen in congenital stridor, but the hindrance offered by the malformation of the larynx to the expulsion of mucus sufficiently explains it.

Geffrier brought forth the theory that it was due to enlargement of the tracheobronchial glands. He claimed these could be enlarged at birth and give rise to symptoms which were analogous to those of stridor. This, however, errs in many respects; the noise is both inspiratory and expiratory, cough is similar to that of whooping-cough or measles, and dyspnœa is marked. Then, too, suffocatory crises occur as often as four or five times a day. This enlargement of the glands in children is exceedingly rare and presents a decidedly different aspect from congenital stridor.

Pathological Anatomy. Lees was the first to show by autopsy the malformation which causes this conditon, and he gives a drawing of the specimen. The patient was a year old when autopsied. It was found that the lateral halves of the epiglottis was so incurvated as to touch each other with their posterior surfaces and almost overlap. The aryepiglottic folds were in close proximity to one another. They were thin and not edematous, the latter fact being important because the child died of diphtheria. There was found between the base of the epiglottis and the approximation of the aryepiglottic folds a rhomboidal opening allowing the passage of air. Lees also mentions a pinhole opening on the superior surface of the epiglottis which allowed some air to enter between the incurved folds of the epiglottis, forming a sort of tube.

Variot, in 1898, autopsied a child twenty-two months old, who died of scarlet fever. He found the epiglottis elongated and the edges approaching each other, and the fibrocartilage thin and supple and of healthy appearance. The aryepiglottic folds were approximated and had to be separated to produce the opening which should exist. This larynx was dissected by Chauveau, who found the arytenoid cartilages longer than usual. The thyroid and cricoid cartilages were normal. It was in this case that he tried intubation and found that the phlange of the tube kept the aryepiglottic folds apart, thus causing the stridor to disappear. Sutherland and Lack confirm with autopsy the above findings. Refslund performed an autopsy on a boy three and one-half months and gives a plate which is similar to those described. The measurements of the parts were:

the epiglottis from base of the tongue to the superior surface 5 mm., from the furrow on the anterior surface to the lateral border 5 mm., or 10 mm. across and 1.5 mm. thick. The furrow was much thinner and transparent than the lateral parts. In this furrow was embedded the connective tissue which forms the median glossoepiglottic ligament coming from the tongue. Owing to the weakness at this point there was great flexibility, hence incurvature was made easier. There was also greater mobility in the epiglottis and the separate halves could be made to overlap easily. Between the arytenoids was a fissure 7 mm. long, formed by the aryepiglottic folds whose edges were close together; from their anterior point of contact to the base of the epiglottis was a separation of 3 mm. Otherwise the larynx was normal.

Thomson and Turner dissected fifty young subjects, some being to the tenth year of life. They found the structures about the vestibule much softer and more collapsible than in the adult, the aperture relatively narrower laterally, owing to the folding backward and inward of the epiglottis and the consequent approximation of the aryepiglottic folds. As the child grows the epiglottis loses its infantile shape and the aryepiglottic folds separate proportionately. They inserted a tube upward in the trachea between the vocal cords and then simulating inspiration, produced the effect of approximating the aryepiglottic folds so as to form a narrow mesial slit. They found that the aryepiglottic folds approximate in infants. They also hold that the peculiar form partially persists up to the seventh year. In this Sutherland and Lack agree.

Symptomatology. The sound has been variously described by the mothers as being similar to "sound produced by hens," "like a chicken," "like a grunter," "purring like a kitten," and "like croup." Dr. Thomson in his able analysis says, "It begins with a croaking noise and ends with a high-pitched note, and expiration is accompanied by a slight croak when the noise is the loudest. It varies in pitch a great deal. In some cases the note is deep, purring or growling, and in others high and squeaking." The latter holds true mostly in the beginning of the disease, the croaking sound as the child grows older becoming more and more prominent. The loudness varies at times and in almost all of the cases there are short periods of intermission occurring at such times as when the breathing is superficial and regular, or when the child is able to notice by having attention fixed, or when asked to speak. If the child be taken from a cold to a warm room, or when the child is asleep, it diminishes. It increases in loudness either on awakening from a sleep, or on being bathed, or if it is fed too quickly. It can be heard through several rooms of the house; in some instances the observers were attracted by the noisy respiration of the child in the waiting-room of their offices. It appears to be louder when the child is most healthy. When noisiest, it is not continuous, for single normal breaths can be

observed. Pauses occur sometimes lasting an hour. They may come without interruption from the noisiest breath and come back also the same way. If often becomes common snoring. It generally has the same timbre and tone-height. Several observers have had the feeling that it was produced by a floating membrane.

There is no difference noted in the sound with the mouth open or shut, or from position. Tatschner observed that on pulling the chin forward it would disappear. In my case pulling the tongue forward under ether did not cause it to disappear.

The stridor increases in loudness for some weeks or months after birth and then continues more or less stationary until the eighth or ninth month. Then it begins to diminish until the eighteenth month. It may last up to the end of the third year. Sometimes it intermits for a month. Even after it has disappeared for a considerable period, if the child takes cold or is out of breath it returns. Occasionally during the third year a short crow or croak is heard. Suckling thought the sound was more intense in sleep and during cry. Lori said in his cases it disappeared for hours between the third and sixth months. He and Refslund observed that it disappeared when the head was depressed or turned to one side; other observers, however, do not bear out this statement.

Signs of Obstruction. There may be cyanosis at times, but often it is absent. This may be produced as a result of coughing, because of the impediment offered by the deformed epiglottis in expelling secretion. Sutherland and Lack found that in 8 of their cases suffocatory attacks came on when the child was asleep, sometimes when awake. In 1 fatal case observed by them the cyanosis was persistent. When intense the jugulum was tumefied.

The respiratory movements are of a peculiar nature, and at first strongly suggest diphtheria. Most observers have reported increased action of the alæ, marked retraction of the episternal notch, supraclavicular fossæ, and epigastrium, and also some retraction along the ribs, in the axillary region especially. As a result of this, the chest shows gradual prominence of the sternum and the costocartilaginous synostoses, giving in effect a rachitic shape. This has occasioned many errors as to the etiology and diagnosis of the affection. It was thought by more than one observer to be true laryngismus stridulus, this being a frequent concomitant of rickets. This however, can be easily excluded, owing to the absence of the signs, craniotabes, and thickening of the epiphyseal ends. The majority of observers have noted rales all over the lungs, which may be due to the transmission of the laryngeal sound. Thomson states that the lungs are not fully expanded and that breath sounds become feeble toward the bases. This may be disproved because of the intensified action of the respiratory muscles and the absence of signs which would show this condition. Rales and rhonchi are common all over the chest and not in special locations. Postmortem reports

do not confirm this, as will be shown under the pathology of the affection.

Variot says that auscultation is of no value, because of noise. Pronounced participation of the abdominal muscles in the respiratory action has been observed. Thomson notes strong action of the sternocleidomastoid muscles. Deformity of the chest persists. Refslund observed movements of the larynx in respiration.

The retraction of the jaw mentioned above in the history of the case is an important factor. It was late in appearance and not observed until the child was over a year old. The retraction caused an occlusion of the teeth of about 0.5 cm. The mouth had a peculiar appearance, yet the child was not a mouth breather. There appears no mention of this symptom in any of the articles published on congenital stridor or on diseases of the thymus, except in one reported by Tollemer, in which stridor ascribed to congenital cardiac malformation existed. He mentions having observed retraction of the jaw of 0.5 cm. His report states that the child was a blue baby and that he worked two hours before the respiration was satisfactory. The presence of this symptom is explained by the action of the muscles attached to the larynx, chin, and hyoid bone, the hyoglossus, geniohyoglossus, digastric, geniohyoid, and omohyoid muscles.

The epiglottis has no special musculature. Luschka states that a small part of the genioglossus muscle is inserted into the ligamentum glosso-epiglotticus medius which has an elevator action of slight development and little importance. These muscles are brought into action when the larynx has a high position, in order to facilitate the separation of the aryepiglottic folds forming the obstruction.

Complications. Most authors insist on the frequency of various pulmonary troubles. Martin observed tracheobronchitis of great tenacity in 1 of his cases. Another child died of bronchopneumonia. Tarny mentions a whooping-cough attack when the child was eleven months old. Guilbert states that bronchitis is frequent, and that one of his patients often had head colds. Rocaz reports a tracheobronchitis in 1 case, in the other 2, bronchopneumonia. One of the latter succumbed. Chauveau's case had bronchopneumonia at eighteen months. In 2 of Thomson's cases dyspepsia was a factor, in a third case the child vomited often and brought up phlegm, in a fourth the child was dyspeptic because the mother did not have sufficient milk, and in the fifth bronchitis was noted. Variot mentions bronchitis in 1, and in another scarlet fever which proved fatal.

Sutherland and Lack had 1 case in which convulsions occurred on the eighth day and recurred up to the second month. One was noted as anemic. Several had bronchitis and 8 had suffocatory attacks. These generally appear within the first two months and are serious. The apnœic condition caused by this peculiar mal-

formation is undoubtedly more frequent than we think. It is not uncommon to hear of newborn children who apparently breathed only with great difficulty at long intervals, sometimes as long as three minutes between each inspiration, accompanied by crowing noise. After a half hour the child would die. Often cases appear in which it is difficult to keep up the respiratory function unless the child is stimulated in various ways, as was observed by Miller, Burral, and others. In these the stridorous breathing continues, but apparently with such effort that the child becomes easily exhausted and dies in a convulsion.

In the first two months of the disease attacks of cyanosis are frequent, but they rarely become so marked as to occasion fear of death. The dyspeptic conditions observed by Thomson and Sutherland, and Lack would seem coincidental.

Suffocatory attacks occur after the first week of the disease, but are of short duration, except in the case of Sutherland and Lack in which convulsions from this source came on every day and lasted two months. Rickets has been mentioned as a common complication. This, however, seems questionable, the error caused by the peculiar conformation of the chest being due to the increased action of the respiratory muscles.

Differential Diagnosis. At first sight laryngismus stridulus appears to be laryngeal diphtheria, as shown by the retraction symptoms and the noise, but after studying the child a little this can be excluded on the following grounds: (1) There is little or no cyanosis; (2) there are no exaggerated efforts to get air as in diphtheria; (3) as a rule, the history of its early origin is within the first week; and (4) there are no diphtheria bacilli.

Adenoids and enlarged tonsils produce a snoring noise which disappears on closing the alæ. In the cases observed only Clarke and Smith, who held this to be a cause, found adenoids or tonsils.

Diaphragm of the glottis is very rare. Fein could find but 13 good cases and 4 doubtful ones. The symptoms are entirely different in character, the voice being hoarse and dyspnœa observed. Most of the cases occurred later in life, from the seventh to the sixty-fifth year.

Foreign bodies in the larynx must be considered, but here the sudden dyspnœa, convulsive cough, and the phonatory troubles are variable. The history is also valuable in excluding this cause. Semon suggests paralysis of the dilators of the glottis. In this affection the voice is normal, but the dyspnœa intense. The patient's age is also against it.

Tumors of the larynx must be considered. Retropharyngeal abscess is frequent in children but not at birth. This can be excluded by the presence of pain and by digital examination for the swelling. The general condition is bad, as a rule, the temperature is elevated, and the child refuses nourishment.

Hyperplasia of the thymus and enlarged tracheobronchial glands have already been discussed. In such early cases as Miller's, one must consider atelectasis of the lungs, as found in the case he autopsied. He reports one-third of the lung expanded and two-thirds non-crepitant. He also noted that the epiglottis was folded.

Rilliet and Barthez mention atelectasis of one lobe of the lung in a case in which dyspnœa had continued from birth until death at two and one-half months, which was thought at first to be due to stenosis of the trachea.

Prognosis. Sutherland and Lack claim laryngeal stridor to be of little hindrance to growth, except in delicate children. It is bad if pulmonary affections occur. There are in all 101 unquestionable cases reported; death resulted in 21. Lees' patient died of diphtheria, aged thirteen months. Of Refslund's 3 patients, 1 died at six weeks of age, and 1 at nine months, cause not given; the third patient had left lobar pneumonia. Variot's patient died of scarlet fever, aged twenty-two months. Of Sutherland and Lack's 3 patient's, 1 died at the age of two weeks, of convulsions after labored respirations and marked cyanosis, but nothing was found at the autopsy; the second, twenty-five months old, died of "pulmonary disease following a persistent bronchitis" of eight months' duration; the third, an infant of ninteen months, died of tuberculosis. Greene relates the case of a child one year old that died of pneumonia. Both Martin and Rocaz report infants dying of bronchopneumonia at twenty months. Ballin had 3 cases of pulmonary disease, in 2 of which death ensued, 1 a girl two and one-half months old, died of bronchopneumonia (confirmed bv autopsy); the second, a boy four months old, had capillary bronchitis (also confirmed by autopsy); the third case, a boy thirteen months old, had pneumonia when nine months old and recovered. Massei reports a boy who died of pneumonia when five months old. Cozzolino observed a boy seven months old with double pneumonia whose stridor disappeared before death.

Miller's 3 cases are especially interesting since death ensued in all within the first twenty-four hours of life. No cry was observed in any of them at birth, and attempts to inspire were irregular and short, accompanied by crowing noise. At times breathing would stop and they became cyanosed. He thought it a spasm, and gave inhalations of ether without effect. Artificial respiration and slapping the back would bring color to the skin. He agrees with Tatschner that the finger behind the jaw would permit respiration to go on easily. The child died apparently of suffocation nineteen hours after birth. On the mother's side, according to her statements, several children died in a like manner a few hours after birth. Burral's patient also died of convulsions two weeks after birth. Levy and Etienne report a boy of seventeen months, who died of œdema of the larynx. Schmiegelow's case is probably one of stridor, with report

of a specimen, his pathological diagnosis being "stenosis of the larynx." He gives a good description of the symptoms which are not dissimilar to this affection.

From the foregoing it is to be deduced that death is usually due, directly or indirectly, to the effects of the stenosis. In 7 cases death seemed directly due to the stenosis. After labored breathing for a period varying from a few hours to two weeks the child would become cyanosed and die in convulsions. The next most prevalent cause of death was bronchopneumonia, in 5 cases. There were 3 of lobar pneumonia, and 1 each of tuberculosis, œdema of glottis, diphtheria, and scarlet fever.

TREATMENT. Tracheotomy and intubation have been tried to alleviate this condition. Variot used the former, but the child failed to retain the tube. However, one important point was gained in that the sound disappeared while the tube was *in situ*. This, as Variot demonstrated postmortem, was produced by the phlange of the tube separating the arytenoids and holding the aryepiglottic folds apart. He advises cutting away the aryepiglottic folds. Ballin did a tracheotomy on one of his patients and the stridor disappeared, but the child died thirty-six hours later of bronchopneumonia.

I think Variot's suggestion to cut away the aryepiglottic folds a good one and should be tried, but in my cases I saw no urgent need of interference and kept the child under observation.

Cutting away the aryepiglottic folds is not a difficult procedure at the present time, owing to recent advances made in endolaryngeal operations by the direct method, especially on children. It is very difficult to operate on a child by the indirect method, because of the smallness of the parts. The introduction of Kirstein's autoscope has rendered the larynx in children very accessible for the cutting instruments. The use of either the Grunwald or the Hajek double curette for working on the sides of the larynx would render the removal of the aryepiglottic folds a very simple matter. The removal of the epiglottis would require a stronger instrument, such as a small-sized tonsil punch. We know that the removal of the epiglottis is compensated for, and no danger can arise because of its removal. The cutting away of the epiglottic folds might be tried first. If this did not give sufficient relief, a fact which could be observed during the operation, the removal of the incurved part of the epiglottis probably would. I do not hesitate to advise this, because there is a minimum of risk.

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WHEN SHALL WE ADVISE TYMPANOMASTOID EXENTERATION IN THE TREATMENT OF SUPPURATIVE OTITIS MEDIA, AND IN WHAT PERCENTAGE OF CASES MAY WE EXPECT A CURE?[1]

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During recent years the prognosis of suppurative middle-ear disease, including all of its complications and eventuations, has very materially improved. A better realization of the importance of the disease has led to its earlier and more persistent treatment, and antiseptic surgery has enabled the aurist to save the lives of many persons whose conditions a few years since would have been looked upon as hopeless. Of perhaps more importance is the fact that surgical improvements have put it in the power of the aurist to prevent many of the serious complications of this disease.

A purulent imflammation of the middle ear may persist for many years without causing serious disturbance of health or destruction

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of any tissue beyond the confines of the tympanic cavity. On the other hand, it is becoming generally recognized now that the mere existance of such a purulent focus is a constant menace to the health and life of the individual bearing it, and that at any moment it may flare up into an active process which will be extremely difficult to check or control.

I suppose it may be taken for granted that this Association would recommend the persistent treatment of every case of purulent otitis media until cured, employing the simplest measures possible as long as they give promise of effective results, but resorting to surgical intervention whenever required to overcome an obstinate otorrhœa. Without at all exaggerating the possibility of dangerous complications or sequels ensuing from direct extension of suppuration, from the tympanum to neighboring vital structures, we are safe in saying that no person who is the subject of a purulent discharge from the middle ear should be permitted to look upon his condition as one without danger to life. Aside from the risk of the graver consequences attending purulent invasion of the mastoid process, the soft tissues of the neck, or the cranial cavity, we must remember that the victim of chronic otorrhœa is suffering a steady drain upon his supply of vitality and that in addition to this fixed charge against his resources he carries an undeterminable, yet constant, risk of secondary personal infection and an incubator for bacteria to supply contamination to his neighbors.

It becomes our duty, therefore, to teach the family physician and the public to recognize the fact that purulent otorrhœa is a symptom of a disease which has a most important bearing upon the patient's continued enjoyment of health and life; that it demands immediate and continuous treatment until a cure results, inasmuch as it is susceptible of cure in almost every instance; and that, while we sometimes speak of the measure which is employed as a last resort in the treatment as "a radical operation," it is not *radicalism* but *conservatism*, which demands surgical intervention in chronic suppurative otitis media when other means of treatment have failed of effect.

The prognosis of suppurative otitis media, when properly treated, is extremely good. The majority of all acute cases respond promptly to proper local medicinal measures. By such treatment is meant simply the procuring of free drainage of excretions from the tympanum and the maintenance of as perfect cleanliness of that cavity as is possible. But, in spite of the early institution of skilful treatment, some cases appear to be in the very nature of things destined to pursue a chronic course. This tendency to chronicity may be the result of excessive activity on the part of the infective agent, of inability on the part of the patient to respond to reparative processes, or of peculiar anatomical conditions or pathological alterations which favor the extension or persistence of the necrosis. General

hygienic care and tonic treatment, supported by patient, well-directed, and persevering efforts to sterilize the tympanum, will render the invading foe innocuous and bring about a cure in the large majority of this class of cases.

Neglect is perhaps the greatest factor in the causation of chronic purulent otitis media. Ignorance of the character and dangers of the disease, reliance upon home treatment, carelessness in the employment of remedies and measures properly recommended by the physician, or the use of agents better fitted to excite than to allay purulent inflammation, are among the factors we frequently have to blame for the existence of a chronic otorrhœa when first it comes under our notice. But even these chronic cases have a very favorable prognosis when brought under proper treatment, for it has been demonstrated that taking them as they come, and including cases of many years' standing, fully one-half will recover under simple drainage and antisepsis.

Something less than 50 per cent., then, of the chronic suppurative otitis medias will require the consideration of some more energetic measures, such as surgical assistance, for the removal of polypoid tissue or necrotic ossicles through the external auditory canal, or the more extensive surgical intervention embodied in the so-called radical operation. Ossiculectomy, intratympanic curettage, occlusion of the tympanopharyngeal tube by a flap from the tympanic membrane, and removal of the tympanic scute through the external canal are simpler surgical measures which promise satisfactory results in some cases. It is surprising what a large percentage of the very worst-looking cases will respond satisfactorily to the exhaustive employment of painstaking measures to cleanse the tympanum of debris and free it of infective material. If due care is exercised in diagnosticating the factors accountable for chronicity in each case and conscientious efforts made to remove or overcome them, efforts which shall be continued patiently and perseveringly over a period of several weeks or months if necessary, according to the circumstances attending the particular case, I believe but a small minority of even the chronic otorrhœas will require the operation of tympanomastoid exenteration. It seems to me this operation is properly to be held in reserve as a last resort for those cases which do not succumb to milder forms of treatment, but that, while an honest effort to procure healing by simple measures should precede consideration of surgical attention, indefinite prolongation of such treatment is not justifiable; and the fact that serious complications have not supervened does not excuse interminable delay. Not all cases are cured even by the radical operation, but the vast majority are; and so, only an insignificant percentage of the whole number of otorrhœas is left unhealed after thorough treatment. That this small proportion will steadily decrease in the future as the technique of the major operation improves in the hands of the mass of operators, is to be expected.

Nothing has been said regarding those cases of either acute or chronic otitis media in which positive evidences of mastoid or cranial invasion are present, it being assumed that all are agreed upon the necessity for prompt operative intervention as the only safe form of treatment, and that the operation of complete tympanomastoid exenteration should be performed if necessary in order to ablate the disease. It is the object of this paper to consider more particularly that large group of chronic suppurative otitis medias in which the predominant symptom is otorrhœa, and in which no serious complications have arisen. Concerning these cases, if we admit the fairness of the prognosis stated above and accept, as a foundation for determining the treatment to be selected, the belief that while most cases can be cured by drainage, antisepsis, and middle-ear operations a small number will require the major operation, and that this operation is not only a justifiable procedure, but should, as a rule, be employed rather than permit the disease to continue, it becomes necessary to consider the following questions: (1) What are the indications that justify tympanomastoid exenteration? (2) What are the dangers and risks of the operation as compared with the disease untreated? (3) What may we safely say to the patient regarding relief from the otorrhœa and the restoration of function?

1. *What are the indications for tympanomastoid exenteration in the treatment of chronic suppurative otitis media, without evidences of mastoid or cerebral complications?*

Purulent otorrhœa is, perhaps, the single symptom complained of, and, assuming now that other forms of treatment have been properly tried and have failed to control this discharge, we must be guided by a study of the excretion, the determination of the pathological lesion within the tympanum, and the patient's general physical condition. Ascertaining the nature of the bacteria present in the pus affords very little if any assistance, but such investigation should always be made. As a rule the infection is a mixed one. When streptococci are present in considerable numbers we may bear in mind the especially virulent character of this organism, but it is not safe in any given case to look upon the diplococci or staphylococci as less dangerous. I have seen a fatal result in one case of pure infection by Staphylococcus albus, an organism that is looked upon as comparatively innocent. Of much more importance is the discovery of bone-dust or epithelial cells in the excretion. If the washings from the tympanic cavity be centrifugalized and the sediment, under microscopic examination, shows particles of bone structure, we have positive evidence of bone destruction going on, and this is one of the strongest reasons that can be urged for operation. Likewise, the finding of epithelial cells in the pus or in the washings warns us of the possible presence or formation of cholesteatomatous masses, and, if in addition cholesterin crystals

are discovered, we have positive assurance of the existence of a dangerous element. These features of the microscopic investigation are the most important single elements in determining the advisability of surgical intervention.

As regards the gross pathological changes in the tympanum, very little information of prognostic value can be gained from their inspection. Lesions of the internal wall can rarely be made out because the disease, when it does spread in that direction, most commonly passes through the round window or, less frequently, through the oval window after erosion of the foot-plate of the stapes. Pus exuding from the oval window or from the promontory, particularly if it rapidly reappears after being wiped away, is positively diagnostic of labyrinthine invasion, and the appearance of granulation tissue springing from the inner tympanic wall, with roughened carious bone underneath, is characteristic of necrosis of the labyrinthine capsule. Tinnitus and vertigo accompanying purulent otitis media, with or without the objective evidences of labyrinthine disease just referred to, while not affording conclusive proof of the extension of purulency, are sufficiently suggestive to justify an exploratory operation and this should always be in the nature of a complete tympanomastoid exenteration. When dealing with large polyps which protrude into the external auditory canal we may well consider the advisability of attempting their removal by a simple snaring operation, to be followed by appropriate local treatment, or the performance at once of the radical operation. Such growths almost invariably spring from an area of carious bone the extent of which disease cannot be prejudged. Forcible evulsion has not infrequently been followed by serious complications; the tearing away of a sequestrum, opening up healthy tissue to the pyogenic organisms which seem to become remarkably active after perhaps a long period of lethargy. If it appears that the polyp has its attachment to the roof of the tympanum or its internal wall, it is probably wiser either to make its removal part of an exenteration operation or to inform the patient that such an operation may soon become necessary. I am, personally, inclined to look upon a middle-ear polyp, whose base I cannot accurately decide to be situated in a comparatively innocent site, as sufficient reason for recommending the radical operation. When a polyp is removed in this way the operation can be completed satisfactorily, the entire suppurative process probably be disposed of at the same time, and the operator has better control of the situation for the prevention of future complications.

Another visible evidence of extratympanic purulency is the finding of pus trickling down over the internal wall from the region of the additus ad antrum. This affords a strong inference of antral infection, and as irrigation is presumed herein to have failed, proper drainage can be secured only by operation through the

mastoid. In those cases of suppurative otitis media in which the ossicles are still present, though possibly diseased, we have naturally to consider the relative merits of middle-ear operations through the canal and of complete exenteration. It is scarcely within the province of this paper to discuss that matter, though some mention of it must be made. It was understood as a premise that, whenever clearly applicable, simple middle-ear operations would be given preference over the more extensive major procedure. Naturally there will arise a series of cases wherein opinions would differ as to the applicability of the several operations. I can imagine one surgeon advocating radical measures while another of equal ability and professional prominence would in the same case prefer to try, first at least, ossiculectomy. It is conceivable also that the latter might secure a cure in some of these cases. Consequently there is room for much honest difference of opinion in the selection of cases. The conservative ground to occupy would seem to be a preference for the radical operation only when granulomas, epithelial cells or bone-dust in the pus, or clinical symptoms of extension of the disease beyond the confines of the tympanic cavity point to the necessity for some operation more thorough than can be performed through the canal.

Occasionally the patient's general state of health may be a determining factor in the decision to operate. Just how much influence a chronic purulent otitis may be exerting upon the general system it is always difficult to say, but it is reasonable to suppose that sufficient toxins may be absorbed from the tympanic disease to prove a seriously disturbing obstacle to the growth and development of a child or to cause a decline in the vitality of an adult. It has seemed to me that this possibility has too seldom received its meed of consideration. When considering the indications for operation I should be, therefore, more strongly inclined toward intervention if the patient's general physical condition was below par than if the patient were robust, other things being equal.

2. *What is the prognosis of the operation itself? What are the possible dangers of the operation? How do these risks compare with those of the neglected disease?*

Under the head of prognosis we should consider: (*a*) The question of mortality; (*b*) deformity of the face; (*c*) failure to cure the condition for which the operation is performed, and (*d*) further impairment of the hearing.

(*a*) Any operation which requires the preliminary institution of anesthesia is, of course, attended by the possible mortality of the particular anesthetic employed. As anesthetics are given today in the best hospitals, this danger is reduced to the lowest calculable point, and is so small as be practically a negligible quantity; though the patient or his guardians should always be informed that death from anesthesia is a possibility. In view of the fact that it is generally

impossible prior to operation to ascertain with any degree of accuracy the extent of the necrosis, and recognizing also the fact that some of the most careful clinical observers have disclosed at operation complicating lesions which were entirely unsuspected, we must admit the possibility of some few fatal results from the excitation of latent purulent foci or from the coincidence of having operated at the moment when an otitis media was breaking into vital structures. But has the operation any mortality *per se?* Theoretically, one would be inclined to answer this question in the negative, but, practically, it seems impossible to do so. The region attacked is one where a slight error in technique may be followed by serious consequences, and few of us will claim infallibility. A very small number of cases, yet sufficient to demand consideration, have been reported in which death followed the operation without explainable cause. At the 1904 meeting of the American Otological Society, Jack reported a death after operation, for the relief of otorrhœa, upon a particularly robust and healthy man, and Harris spoke of a similar instance occurring in the practice of Dr. Toeplitz. The fact that but few fatal results have found their way into otological literature does not prove their infrequency, but there is no apparent reason for assuming, as some have, that a sufficient number of fatalities have occurred to give the operation an appreciable mortality.

Zeroni,[2] in a most interesting and instructive article on Postoperative Meningitis, reports a critical analysis of 40 cases of death following this operation for the cure of otorrhœa, which he has been able to find in German literature. Careful postmortem examination showed that in 29 there had existed an unsuspected labyrinthine disease, in 10 there was a latent meningitis or extradural abscess, and 1 remained unexplained. This argues the necessity for a more careful search for these deep-seated conditions in cases which we propose to submit to operation. He believes the operation less dangerous than the disease, because a study of these autopsy materials convinced him that most of the cases were steadily progressing to a serious termination and would have inevitably ended fatally had no operation been performed.

(*b*) Since almost all operators now seek primary closure of the mastoid wound in this operation we may pass any consideration of the deformity from postaural openings. The only deformity of an annoying character that may result is that of facial paralysis. Even the most skilful operator, taking every precaution to protect the nerve will occasionally have a paralysis following this operation. When such an unfortunate sequel results we should be slow to impute carelessness or clumsiness to the surgeon. The mere exposure of the nerve sheath to the atmosphere, to infection, or to pressure from the dressings may cause a neuritis or a paresis, and I believe that is

[2] Archiv f. Ohrenheilk., December 15, 1905, p. 199.

often the explanation of those cases in which the appearance of the paralysis is delayed for from twenty-four to forty-eight hours after the operation. Touching the nerve with the instruments is, of course the most probable cause of the majority of these accidents, but unless the nerve is grossly injured the chances of recovery are good. Complete severance of the nerve or gouging out a portion of it may result in permanent loss of function. The simpler traumatisms or irritations produce only temporary loss of power. In spite of the belief in a good prognosis, one nevertheless views a postoperative facial paralysis with distress and apprehension.

(*c*) Complete cure of the suppurative otitis media does not always result from a satisfactory exenteration. With the best and most experienced operators there still remains a high percentage of failures to cure otorrhœa by this operation. Satisfactory statistics are difficult to arrive at, partly on account of the varying basis on which the indications for the operation are placed. Thus the surgeon who employs the operation for nearly every case of chronic suppurative otitis may be expected to show a higher percentage of cures than one who performs exenteration only in those cases that have been first subjected to every other form of treatment without avail. It may be said also that so far there have been very few statistics published from which conclusions might be drawn. Some of the most prominent surgeons making such reports, and who probably operate only when other forms of treatment would not promise good results, are the following: Stacke has reported 37 cases operated upon with 27 cures (73 per cent.); Panse 57 cases with 31 cures (54 per cent.); Grunert 43 cases and 24 cures (55 per cent.); Poli 40 cases with 32 cures (80 per cent.); and I recently heard Dr. Dench say, in a discussion of this subject, that while in the first hundred cases he had only about 70 per cent. of successes, in a second series of cases about 80 per cent. of cures had resulted.

(*d*) The effect upon the hearing is a question invariably asked by the patient, but I am not sure as to how much consideration it deserves. Conservation of the hearing or of a fractional portion of it has a different value for different individuals. A great many people might be deprived entirely of the function of one ear without being seriously handicapped in their business or social relations. On the other hand, persons whose condition demands acute hearing power can ill afford to lose any or, having lost some by disease, must avoid risk of its further diminution; particularly is this true when both ears are involved. We have all seen cases of extensive destruction of the membrane and ossicles, with persistent otorrhœa, in which the hearing remained nearly normal. In such a case, unless there is some urgent reason for operating, it is quite proper to estimate the possibilities of further impairing the function of the organ. In the attitude I have taken, of recommending operation only in those cases of extensive middle-ear disease, in which other treatment has

failed, the hearing power is usually a negligible quantity and occupies a minor place in the consideration of operative treatment.

A few operators have claimed remarkable improvement of hearing following operation in some cases, but as nearly as I can estimate it we are not, as a rule, justified in promising or expecting improvement in the hearing and in many cases will find that it is impaired by the operation. Should we be so fortunate as to eradicate the disease and secure a healthy skin lining for the new cavity formed by the junction of the antrum, tympanum, and external auditory canal it is quite probable that in the majority of instances this very process of epidermization, which contributes to the success of the operation, adds something to the impairment of motion of the stapes. The better the mobility of that ossicle prior to operation the more likely is it to suffer from this cause. It is perhaps only in those cases in which the stapes is firmly fixed by fibrous tissue that the operation improves its ability to respond to sound waves, by liberation from the restricting bands.

How do the risks of the operation compare with those of the disease? It is impossible to make a satisfactory comparison inasmuch as accurate statistics are not obtainable on either side. I have stated my belief that the operation is not very dangerous to life and that most of the deaths that have followed the operation have occurred from some complication previously existing, though unsuspected, rather than as a direct result thereof. Neither can the dangers of the disease be stated explicitly in figures. We all know, however, that the majority of purulent affections of the brain have their origin in neglected otitis media and that many cases of infective enteritis and fatal bronchopneumonias, especially in children, originate from the same source. A most significant fact to be remembered in this connection is that no reputable life-insurance company will take a risk upon an individual who is or has recently been the subject of a purulent otorrhœa. The business man's estimate of such risks is worthy of consideration, at least it may have more weight with the lay mind than any medical argument. In a very instructive paper by Whitehead[3] on the complications of temporal bone disease, based upon a study of the work performed at the General Infirmary at Leeds, England, during the last fifteen years, I find the following significant statement: "There was an antecedent history of chronic otorrhœa in 21 out of the 33 cases of meningitis; in 17 out of the 20 cases of sinus thrombosis; in 20 out of 21 cases of cerebral abscess; in 13 out of the 15 cases of cerebellar abscess, and in 1 out of the 2 cases of combined cerebral and cerebellar abscess." This comes from a general hospital where patients were not admitted previously because of ear disease.

In conclusion, viewing the question from these various stand-

[3] Archives of Otology, 1906, xxxv, No. 5.

points, I would formulate the following rules for guidance when considering the treatment of persistent chronic suppurative otitis media:

1. Broadly speaking, practically every case of suppurative otitis media is assumed to be susceptible of cure by one means or another.

2. Every case of chronic suppurative otitis media, without symptoms of intracranial invasion, should be treated patiently and persistently for a reasonable length of time, but not indefinitely, by well-directed efforts at cleanliness and antisepsis through the external auditory canal. When it becomes evident that these simple measures or minor operations cannot cure the disease, tympanomastoid exenteration should be advised unless in a given case there exists some special reason of socio-economical character that justifies delay and the risks of the disease.

3. The clinical evidences of an inveterate purulency that may help one to decide the question of when to recommend operation are: the finding of cholesteatomatous masses, epithelial cells, or bone-dust in the washings from the middle ear, the tracing of the source of pus to the mastoid antrum or labyrinthine capsule, or the existence of granulomas springing from carious areas of the tympanic wall which cannot be directly inspected and treated.

4. The possible dangers of the operation are believed to be far less than those of the disease.

5. The patient should be told that not every case is curable, even by an operation (the percentage of cures in the obstinately chronic cases probably approximating 70 per cent.), that the hearing power will probably not be improved and may be somewhat impaired, but, that the serious nature of his disease warrants surgical intervention as a prophylactic measure.

6. Every patient upon whom an operation of tympanomastoid exenteration is contemplated should be most carefully studied for a considerable period of time, in order that the slightest evidence of latent meningitis or purulent labyrinthitis may be detected, and when there exists any reason to suppose that the disease has extended beyond the bounds of the tympanic cavity the patient or his guardians should be told that an element of danger attends the operation. The possibility of postoperative complications cannot be ignored and the surgeon must safeguard himself.

SOME CAUSES OF FAILURE IN PLASTIC OPERATIONS ON THE FEMALE GENITALIA.[1]

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Every gynecologist who has opportunities in public and private practise to review his own work and to see that of others, realizes that a very fair proportion of patients upon whom a plastic operation has been performed present either functional or anatomical failure. It is much fairer to our patients, and more just to ourselves, to be self-critical in this matter, than to ignore the fact or to be unduly hypercritical of the work of our colleagues. It is to a consideration of the causes of this failure that I invite attention.

What constitutes a failure in the result of a plastic operation? It may be an *anatomical* failure, a *functional* failure, or a *symptomatic* failure. Perfectly adjusted and united wounds may fail to relieve a woman of her backache or bearing-down pain, because a curettage was omitted or because a heavy, metritic uterus still lies retroverted or retroflexed; or, union may be incomplete or entirely lacking, with the result of a continuance of the symptoms of which the patient originally complained. Again, the restoration of a cystocele or a perineum may be perfect as far as anatomical and functional results are concerned, while the nervous, excitable, irritable woman may continue indefinitely to complain of her pain, her backache, her bearing-down pain, and the long train of symptoms accompanying a nerve wreck. It is, therefore, plain that three important elements enter into the performance of a plastic operation: the patient, the operator, and the technique of the operation, including the after-treatment.

The Patient. We are all too prone to decide, when a woman comes to us with a cystocele, a rectocele, a laceration of the perineum, with symptoms corresponding to those we have learned to attach to these conditions, that operative measures will give her relief. I do not contend that this is not so in the great majority of cases; but we have a further duty than merely to substantiate our diagnosis. We must enter into the daily life of this woman, scrutinizing as carefully as we may her domestic and marital affairs, her relations with those with whom she comes into daily contact, her physical and mental life, and their abnormalities. In other words, we must learn to know the woman as well as we try to know the case. I know this is trite, but it is surprising how many times these elemental yet important factors are overlooked; and in no field of surgery is their recognition more vital than in that which has to do with unfortunate incomplete, or ignorant obstetrics.

[1] Read at a meeting of the Obstetrical Section of the New York Academy of Medicine, February 28, 1907.

The selection of patients for plastic operations, then, is the first important step. Those suffering from serious constitutional disease should be treated, as far as possible and consistent with comfort to them, by means other than surgical. Diabetes, chronic nephritis, exophthalmic goitre, active tuberculosis, are contra-indications to operation, except in cases of rectal or vesical fistula, or complete lacerations of the perineum, which threaten the patient's life by sepsis or make her a mere living burden. Even these operations, and the other plastic procedures, are likely to result in total failure or even in death if undertaken in the face of these systemic diseases. We are occasionally compelled, however, to intervene, because of the patient's constant or increasing misery.

Aged women, who can be made comfortable with the aid of a pessary are also better treated thus, than if they are subjected to operative intervention. I have been treating a woman, now seventy-eight years of age, for five years by this means, with perfect satisfaction, the complete prolapse from which she suffers being perfectly controlled. The reason for careful consideration in the case of the aged lies in the greater possibility of postoperative accidents which may befall them: pulmonary embolism, thrombosis, or apoplectic seizures. It is small comfort to have a large cystocele or rectocele perfectly healed, if we have the patient die three weeks after the operation of pulmonary embolism, as happened in one of my cases.

Still another contra-indication on the part of the patient lies in the short time which may have elapsed since labor. Unless a perineal laceration can be repaired within a few hours or a few days after the birth of the child, it is far better, in my judgment, to wait a full eight months. Before this time the tissues are not only still exceedingly vascular, making hemostasis difficult, but they are very brittle as well. Denudation is thus made difficult, and the mucosa tears off in strips, instead of being easily peeled off. I had this experience a year ago, desisted from the operation, and did it four months later without difficulty. Sippel[2] has also recently reported two similar instances, and although these are unique accidents in his experience, he urges that we should no longer accept six weeks' postpartum as the selected time for the performance of a secondary plastic operation, but should await a complete involution of the mucous membrane.

Finally, women who are in what we call a "run-down" condition, whether from too frequent births, too constant care of children, domestic infelicity, household cares, or what not, should first be subjected to the proper sort of tonic treatment. Their bowels, their sleep, their appetite, their exercise should be judiciously prescribed for. Brown has demonstrated favorable results from operations on the insane, and apparently these unfortunates offer no

[2] Zentralbl. f. Gynäk., 1906, No. 36, p. 1002.

obstacle to a good result. But the familiar type of woman whom I have described will not be a good advocate of plastic operations; for no matter what operative skill may be employed, or what perfect anatomical result may be achieved, the functional result is not likely to be gratifying either to the patient or the surgeon.

The Operator. In a general way it may be said that plastic operations upon the vagina should be undertaken only by those thoroughly familiar with gynecological work. It is only the gynecologist who knows thoroughly the relations existing between diseases of the uterus and its appendages and the various lacerations of the vagina and perineum. The general surgeon may be perfectly capable of going through the technique of a plastic operation, but unless his training has been as well along gynecological lines—which is rare—he will be more likely to operate when the gynecologist will withhold his ardor, and vice versa. To overlook a unilateral or bilateral disease of the appendages while repairing a torn cervix or performing an anterior colporrhaphy is a technical error which a perfectly performed operation cannot correct. Such a case has very lately come under my observation. On the other hand, the gynecologist can prepare himself for his plastic work only by unremitting toil and ceaseless work. House surgeons should be encouraged to do plastic operations, but always with the assistance of or under the eye of the attending gynecologist. He who is compelled to teach himself does not always have the most proficient of instructors.

Finally, the operator must be born with, or must acquire, a "plastic imagination," if I may coin a phrase. The first examination, or, possibly, subsequent study of the patient, must unerringly disclose to him the nature of the operation which he will be called upon to do. Is the cervix merely eroded, or is it lacerated? Is there present simultaneously both a rectocele and a lacerated perineum, or do these exist separately? Do the symptoms and the findings justify the performance of an anterior colporrhaphy? These are questions which every man unconsciously answers for himself. But back of this reply, and dominating it completely, lies the controlling factor of all medical and surgical procedures—experience. It may be possible for one to learn how to perform plastic operations from reading; but no number of monographs or text-books can teach one judgment and experience.

The Technique of the Operation, Including After-treatment. Under this heading, the general statement must first be made that the main element leading to failure in plastic operations is a failure to appreciate the character of the operation to be performed. Küstner[3] has done good work in pointing out that typical or classical operations are not necessary when only a part of the vagina or perineum are involved. Thus, it is quite unnecessary

[3] Kurzes Lehrbuch der Gynäkologie, Jena, 1901, p. 60, seq.

to perform a typical Hegar or Emmett operation for rectocele or for a relaxed vaginal outlet if only the right sulcus or the left sulcus of the vagina is involved. His teaching goes even further in urging the operator to restore in his mind the exact contour of the original laceration, and to denude and suture this only. It is the ideal method, but like many ideal propositions, it works well only in isolated cases; but distinctly to be included in this group are the vaginal lacerations which lend themselves readily to this form of correction. The general statement may be left for discussion, that the operator shall not do more than to correct pathological conditions.

On the other hand, however, no factor contributes more frequently to failure than incompleteness. To attempt to correct a complete laceration of the perineum by the flap-splitting method, let us say, without denuding and repairing the invariable vaginal laceration, involves inevitable failure; and yet this is not an uncommon blunder. But perhaps the most common error in this category is the suture of the vaginal mucosa in either anterior or posterior colporrhapy without including the fascia in the former case, the muscles and fascia in the latter. And I must state, with all due deference to those who have strenuously advanced opinions to the contrary, that an operation for cystocele is not complete unless it includes a pushing back of the bladder and its retention in its new position by some method of suture. It is perfectly immaterial, I believe, what the form of the denudation is, provided the bladder is properly retained; but just as the Stolz operation of former days has been relegated to oblivion, so will all others be which depend merely on the principle of removing or denuding various figures or forms of the mucous membrane only of the anterior vaginal wall.

In precisely a similar way, operations involving the posterior wall will fail unless the fascia or muscles, or both—depending upon the variety or extent of laceration—are included in the suture. And again as to these operations, I think it is entirely immaterial what the figure of the denudation is, provided the original laceration is included and the suture is so directed as to embrace the torn underlying tissues.

One more word as to the general causes contributing to failure. The denudation or the suture of the underlying tissues must be so done that the suture of the mucous membrane will lie in the median line, or the resulting scar will deviate to one side or the other, marring the cosmetic effect of the operation. It is also important that like tissues be joined, avoiding the suture of mucosa to skin, fascia to mucosa, etc. This is such a self-evident proposition that I hesitate to mention it, but I have seen some ludicrous sequels resulting from this error.

Let me now briefly take up some of the minor details of operative technique which often lead to disaster. First and foremost is the

preparation of the patient. Many an extensive and well-performed plastic operation has been ruined because the patient's bowels have moved during the procedure. This is because the last enema given did not come away clear. While the nurse is ostensibly at fault, the real fault lies in her insufficient understanding of the necessity for a perfectly empty rectum, and this is directly traceable to her instruction. Experienced and well-taught nurses do not make this blunder, and the fact that it occurs at all is an argument in favor of permanent head nurses, at least in gynecological wards. In line with the same mode of infection is the habit of some operators of inserting the finger in the rectum while suturing the posterior vaginal wall. While this is, at times, a safeguard against passing sutures too deeply, it almost goes without saying that it should not be done unless the finger is protected by a sterile finger-cot or glove; but the tying of sutures should then be done by an assistant.

A too liberal use of antiseptics, especially bichloride of mercury, and a too vigorous "scrubbing up" of the vagina, may so injure the vaginal mucous membrane that it will not heal readily. Plain sterile water contains all the necessary virtues for irrigating during the operation. The tissues attacked must also be subjected to as little bruising as possible; or, as in other parts of the body, healing will be decidedly interferred with.

As to sutures and suture materials, much could be written which is quite unnecessary. A very prominent cause of necrosis of tissue, following plastic operations, lies in tying the sutures too tightly, especially if they are of chromic catgut. Placing the sutures too near each other is another fruitful source of strangulation of the tissues, leading ultimately to healing by granulation. Personally, I believe it is not a matter of much moment what kind of suture material is used, provided the sutures are placed at proper intervals, are not tied too tightly, and, if they are of silk or silkworm-gut, are removed before they tear through, or strangulate the tissues, or become loose. Chromic catgut used as buried sutures, however, in posterior colporrhaphy, is to be avoided; as by its continued presence near the rectum it may become infected.

Perfect hemostasis is an important desideratum in plastic operations. I have seen a considerable number of cases in which secondary operations were necessary because the wound had been forced open by a hematoma from oozing vessels. Especially in cystocele operations the oozing is apt to be extensive if the plexus of veins lying between the uterus and the bladder is injured when the latter is pushed back. The arteries in the submucous tissues are usually small, but it is good technique to ligate them to avoid subsequent hematomas. For years Zweifel has been preaching perfect hemostasis in gynecology as a prophylactic measure against infection. In no department is it more important than in the one under consideration. A smal hematoma, while it may not tear asunder the sutures, is obviously a fertile source of infection.

A frequent source of functional failures in plastic operations lies in the too tight closure of the vulvar outlet. The anatomical result may be perfect, but if the denudation has been made too wide in the posterior wall, or too broad in the anterior wall, or both, coition and urination may be interferred with to a considerable extent. The reverse is also true, for even if the patient is functionally relieved or even cured of her symptoms, the result is a failure if the vulva gapes and the sulci still show the effects of the original laceration.

The common experience of finding only the skin of the perineum sutured and the muscles and fascia ununited has been touched upon. In no case of this kind can the functional result be worthy of consideration, since the anatomical lesion remains uncorrected.

In operations upon the cervix a not common, but still not rare, sequel is the finding of the cervical canal closed, with the development of a hematometra. I have seen this but twice; but it is, of course, due to imperfect technical procedure, and is an almost unpardonable blunder.

Turning now for a moment to the after-care of plastic cases, two points only will be mentioned. One is the blundering error of permitting a full-sized rectal tube to be passed in cases of complete laceration of the perineum. Unless a tube of small calibre is passed along the posterior rectal wall, infection with giving way of sutures is almost certain to occur, vitiating the entire operation. A suitable length of time, for the same reason, must be allowed to elapse before the bowels are permitted to be moved. These statements are so obvious that I would not mention them were it not that experience and observation have taught me that too often operations fail because of the omission of just such details. The second point is that catheterization must be rigidly aseptic; for a woman is not cured who leaves our hands with a chronic cystitis. This again is a subject for scrupulous teaching to nurses.

I am perfectly aware that I have omitted much that could be said about the causes of failure of plastic operations. I have tried to touch upon some of the essential sins of omission and commission. By no branch of their practice are gynecologists more closely judged than by their plastic work, and a thorough discussion of this subject cannot fail to bring out opinions which will be of general benefit.

CHRONIC EXTERNAL OPHTHALMOPLEGIA.

By Wm. Campbell Posey, M.D.,

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The patient presenting a rather unusual form of disease, chronic external ophthalmoplegia, a girl sixteen years of age, who came to my service at the Wills Eye Hospital, said that she had always

been well and strong, having been raised on a farm and having spent most of her time in the open air. Her mother died twelve years ago, of unknown cause, but her father is still alive and well. She never had brothers or sisters. The patient's grandmother had a goitre, but there were but few others with goitre in the region from which the patient came.

Examination showed the girl to be unusually large and strong for her age. The head was especially large and the features heavy, but there was no enlargement of the hands or feet. The thyroid was of normal size. Ptosis, and to a marked degree, existed upon both sides, the palpebral fissure on the right side being reduced to 5 mm., that of the left to 3 mm. in breadth (Fig. 1). Both eyes were fixed, the right eye looking straight ahead, with the left slightly divergent (Fig. 2), and all motion was abolished, except when the patient was requested to look down, when both eyes could be moved in that direction about 2 mm. Upon forceful efforts to raise the lids the palpebral fissures on both sides were made 2 mm. wider. The pupils were 3 mm. in size and were active to light and accommodation stimuli. In the right eye vision equalled $\frac{5}{9}$ and type 0.50 D. was read from 10 to 20 mm.; in the left vision equalled $\frac{5}{7}$, and type 0.50 D. was read from 10 to 20 mm.

Dr. Weisenberg kindly tested the muscles of the eyes and face for reactions of degeneration, but with negative results.

Chronic external ophthalmoplegia is a rare disease; it develops generally in infancy or early childhood, seldom later in life, without symptoms indicating involvement of other parts of the nervous system, and slowly progresses until all or nearly all of the extra-ocular muscles, including the levator, are palsied. The course is entirely chronic, and thirty years or more may elapse before the eyeballs are fixed and immobile. Both eyes are affected, though rarely simultaneously, symmetrical involvement of the muscles of both eyes being seldom observed. Diplopia is not often complained of, by reason of the slow development of the disease, and because of its appearance in early childhood, before binocular vision has been properly established. In many cases, however, double images can be evoked by suitable tests. Although the progress of the disease is subject to fluctuations, and there may be long periods during which the process seems to be at a standstill, after the maximum degree has been attained and the eyes are fixed, they remain so permanently. The pupils and the ciliary muscles escape in nearly all cases. Vision also is unaffected and the ophthalmoscope shows no fundus changes. The health is good and signs of involvement of other parts of the nervous system are absent. Only in exceptional cases is there a complaint of headache and marked drowsiness.

Although, as just stated, most of these cases arise in infancy, Wilbrand and Saenger do not think that the term "infantile nuclear atrophy," which was applied to them by Möbius is proper, as they

assert that quite analogous cases, clinically, have been observed between the ages of fifteen and sixty years. Thus, of 32 cases collected by these authors, 6 developed in earliest childhood, 7 between

FIG. 1.—Chronic external ophthalmoplegia, showing pronounced ptosis, with fixation of both eyes in the primary position.

FIG. 2.—External ophthalmoplegia, showing fixation of both eyes—the left slightly divergent.

two and six years of age, 5 between seven and twenty, 6 between twenty-one and thirty, 3 between thirty and fifty-three, while no record was made of the developmental period in 5 cases.

At its commencement the disease may assume a subacute character, gradually merging into a chronic progressive stage; usually, however, it is chronic from the beginning. Individual muscles are at first affected in some cases, this being particularly true of the levator, so that a unilateral or bilateral ptosis may be for some time the only ocular sign. Ptosis, however, is present in all cases, varying from a moderate drooping of the lid to complete closure. The degree of the ptosis also changes at different times, being increased usually by physical and psychic causes.

The diagnosis of the affection is not difficult, and, as suggested by Wilbrand and Saenger, it can usually be differentiated from other forms of ocular palsy by three points: (1) The binocular character of the extraocular muscle palsies, including the levator; (2) the absolute non-involvement of other parts of the nervous system, and (3) the frequency with which the disease begins in childhood.

It is often not easy, however, to differentiate the affection from congenital palsies, though in these cases the palsies are frequently unilateral, while in ophthalmoplegia externa they are always bilateral; congenital palsies are stationary, while those under discussion are progressive; and finally in congenital palsies there are frequently secondary deviations.

Nothing is known of the pathogenesis, as no uncomplicated case has come to section. A slow necrosis of the nervous elements, evidencing itself in an atrophic condition of the ganglion cells in the nuclei, with secondary atrophy of their nerve fibers, is the usual explanation of the condition. Although in many cases the nuclear degeneration which occasions the ocular palsies does not progress further, it is not unusual for the ophthalmoplegia to form part of a more general process and to be but the ocular manifestation of tabes or other diseases of the cerebrospinal system.

THE SECOND ANATOMICAL PROOF OF THE VALUE OF THE PARADOXICAL REFLEX.

By Alfred Gordon, M.D.,

ASSOCIATE IN NERVOUS AND MENTAL DISEASES, JEFFERSON MEDICAL COLLEGE, PHILADELPHIA; EXAMINER OF THE INSANE AT THE PHILADELPHIA GENERAL HOSPITAL.

At the February, 1906, meeting of the Philadelphia Neurological Society Dr. F. X. Dercum presented a communication on the occurrence of the paradoxical reflex in a case of localized hemorrhagic pachymeningitis.[1] He observed the presence of the reflex on the side opposite to the lesion before the operation and its disappearance after the clot was removed; then, again, its reappearance when a hemor-

[1] Jour. Nerv. and Ment. Dis., September, 1906.

rhage recurred. The latter was verified at autopsy. In this case the facility with which the reflex was elicited was striking, especially in contrast with the Babinski sign, which was not distinct. The persistence of this sign chiefly prompted Dr. Dercum to advise an operation. His idea proved to be correct.

I now have the pleasure of submitting another case, in which my personal reasoning based mainly upon the existence of the paradoxical reflex proved also to be correct. It concerns a man, twenty-three years of age, sent to me by Dr. J. C. Da Costa at the Jefferson Hospital. He complained of pain in the right side of the head, in the same place where he received an injury six months prior: a heavy bar of iron fell on his head. Examination showed a cicatrix on the right side of the parietal region. Besides the headache the patient presented very pronounced mental hebetude and somnolence. The left knee-jerk was exaggerated and the paradoxical reflex was obtained with the greatest facility. There was no Babinski reflex, no Oppenheim reflex, no ankle clonus. Drs. Dercum and Mills kindly examined the patient and noted the striking contrast between the flexion of the toes on the right side and extension on the left, upon pressure on the calf muscles. They also verified the above statement concerning the absence of the Babinski and the Oppenheim reflexes. A trial of mercurials and iodides was given the patient, although there was no history of specific infection.

Dr. Da Costa trephined the skull at the level of the cicatrix and exposed the upper part of the Rolandic area. As the opening was made, the cerebral tissue bulged out; it was evidently under high tension. The opening was small and the surgeon immediately closed it up. Rapidly the patient regained his intelligence; the somnolence and the headache totally disappeared. As to the paradoxical reflex, it persisted during the first forty-eight hours; then gradually became weaker and weaker, so that at the end of the fourth day it could not be elicited. I saw the patient six weeks after the operation and found the paradoxical reflex, as well as the increase of the knee-jerk, totally absent.

Within the last few days another interesting observation came under my notice. A patient in Dr. W. W. Keen's service at the Jefferson Hospital was suffering from generalized epilepsy. I examined him first about a week prior to his admission and found all the reflexes normal. While in the hospital he had several seizures, which rendered him stuporous and confused. When an examination was made after the first attack I found increased knee-jerks, very slight Babinski, and a distinct paradoxical reflex on both sides; the latter were particularly marked and easily elicited. The abnormal reflexes persisted during the entire period of the attacks. Now it is the sixth day and there is no convulsion. The paradoxical reflex as well as others have totally disappeared.

From these two anatomical proofs I feel warranted in drawing

the conclusions that I did from my clinical observations long before I had the good fortune to have operable cases. They are: The paradoxical reflex is a sign of value in the beginning of an organic affection of the motor system or in cases of its irritation. While the Babinski sign is of an inestimable value in cases with a definitely established lesion of the motor system, the paradoxical reflex, to say the least, is a sign of a transient irritation (as in the second anatomical case) or of a slight lesion of the same motor pathway.

REVIEWS.

ORGANIC AND FUNCTIONAL NERVOUS DISEASES. By M. ALLEN STARR, M.D., PH.D., LL.D., SC.D., Professor of Neurology, College of Physicians and Surgeons, Columbia University, New York. Second edition. Pp. 816; 282 engravings and 26 plates in colors and monochrome. New York and Philadelphia: Lea Brothers and Co., 1907.

UPON its publication some four years ago, Dr. Starr's book immediately took front rank, being recognized as a work of superior merit by a distinguished clinician and investigator. Although at that time it well reflected the then existing state of our knowledge of diseases of the nervous system, the passage of time has added materially to this knowledge, changed and modified it in many respects, so that we find this second edition revised throughout, enlarged, modified in many places in conformity with advances in knowledge, and to a discussion of organic nervous diseases, of which only the first edition consisted, a section on functional nervous diseases has been added.

The major portion of the book, 712 pages, is devoted to organic nervous diseases; 86 pages only to the functional disorders. The section on organic nervous diseases is excellent throughout, many the chapters being of unusual merit. Of these one might mention especially those devoted to the diagnosis and location of diseases of the brain and the spinal cord, locomotor ataxia, tumors of the brain, the cranial nerves and their diseases, etc. The facts of significance in the diagnosis of focal and other diseases of the brain and the spinal cord are grouped together in two chapters that for orderly arrangement, terseness of statement, and lucidity of style cannot well be improved upon. Those familiar with Dr. Starr's pioneer work in the study and investigation of tumors of the brain will read with interest and satisfaction his chapter devoted to this subject. His discussion of other subjects is equally meritorious.

The section devoted to functional nervous disorders is as good as its rather cramped quarters permit; but it seems rather inappropriate to devote only 22 pages to epilepsy, 15 to neurasthenia and the occupation neuroses, 14 to hysteria, and 5 to migraine, while at the same time apportioning 61 pages to multiple neuritis. Although one would search in vain for the omission of any essential fact in connection with the discussion of functional nervous disorders, the

widespread prevalence of neurasthenia, hysteria, and migraine, and their importance from a practical point of view, seem sufficient warrant for a relatively more detailed discussion of their symptomatology, diagnosis, and treatment, especially in the interest of the general practitioner. The reviewer also believes that the chapter on syphilis of the nervous system (3 pages) is somewhat inadequate—although this opinion probably results from his ideas regarding arrangement rather than from any lack of information in the book regarding the relation of syphilis to disease of the nervous system; but although the clinical phenomena of syphilis of the nervous system may not always suggest syphilis as the etiological factor, the protean manifestations of this infection suggest the wisdom of a rather detailed discussion of the subject in the interest of early diagnosis, and in the hope of effecting cure before irreparable damage has been done.

But these are details of minor importance. The book as a whole is excellent and reflects much credit on its distinguished author. As he states, "While the extensive literature of neurology has been carefully sifted, its facts collated, and its theories considered, the endeavor has been made to utilize personal observation and experience in the presentation of each subject." In this the author has well succeeded; the volume is a personal book, and reflects well the results of an analytical study of much clinical and pathological material. It may be cordially recommended to the specialist, as well as to the general practitioner, as a trustworthy guide, practical throughout, containing among other important matters many suggestions for treatment, including the results of recent advances in the surgical treatment of brain tumors, diseases of nerves, etc. A. K.

A Text-book of Diseases of Women. By J. Clarence Webster, B.A., M.D., Professor of Obstetrics and Gynecology in Rush Medical College, in affiliation with the University of Chicago, Chicago, Illinois. Pp. 712; 372 text illustrations, 10 colored plates. Philadelphia & London: W. B. Saunders Co., 1907.

The majority of prefaces might well be omitted, since, as a rule they are but so much waste space. Not so, however, the one introducing the present volume, in which Dr. Webster not only very definitely apologizes for presenting the book, but in which he also enters a very vigorous plea for a more wide appreciation of the extrapelvic portions of a woman's anatomy, when considering pelvic disorders.

The book opens with a most interesting and complete chapter upon the anatomy of the pelvis. Embryology, comparative anatomy, frozen sections, and ordinary gross dissections, each plays its

part in making this the best chapter upon the subject in any text-book upon gynecology of which we have knowledge. In this, as in the succeeding chapters, by a system of large and small type, the author has distinguished between the more important material from a practical standpoint and that of less vital interest to the ordinary student, thus, we believe, performing a valuable service to his readers.

When considering the etiology of that form of dysmenorrhœa supposedly due to contraction of the cervix, he states his belief that the canal in these cases may be blocked by pieces of membrane, resulting in a partial damming up of the blood. In other words, he would widen greatly the class of membranous dysmenorrhœa, by including not only the cases usually classed here, but also those in which the extruded material is in small bits. Whether or not this is the correct explanation of these cases may be questioned, but it nevertheless is typical of the refreshing character of much of the volume.

We are glad to see the chapter upon the microörganismal flora of the genital tract, and we are much pleased with the saneness of his contribution upon neuroses in relation to pelvic disease. We wish that his advice in regard to the position of operative treatment in neurasthenia could be more generally appreciated, he believing that, while interference is proper if remediable lesions be present, on the other hand, operation is not to be placed in the fore-front of the therapeutic measures for the treatment of this condition, but that it is only to be invoked after careful neurological treatment has been carried out. A very interesting observation, which will be bitterly opposed in some quarters, is that in certain cases there is association between these neuroses and small cystic degeneration of the ovaries, and that therefore partial resection of these structures is to be recommended, upon the ground that there may be grave metabolic disturbance caused by the altered ovarian secretion.

We recommend the chapter upon case taking and physical examination to the careful attention of those especially concerned in the management of clinics. Not only is a valuable scheme given, similar to a number of others within our knowledge, but a most careful explanation of the different facts to be elucidated adds greatly to the value of the chapter. We note with pleasure that in his description of the various methods of cystoscopy he gives preference to that of Kelly.

Detailed consideration is given to the various minor gynecological measures, as the douche, tampon, etc., and in this connection the author strongly advises against the use of so-called pelvic massage, upon the ground not of its uselessness, since he admits that it has undoubted influence upon the blood and lymphatic currents and that therefore absorption of exudate may be produced, but because

of its bad psychic influence upon the patient—an opinion with which we are in hearty accord, and which will be shared by the vast majority of competent men. As was to be expected the author, in dealing with the question on surgical technique, has written a chapter which is an embodyment of the best thought upon this important subject. He is, of course, an advocate of rubber gloves, and equally, of course, of their use dry. He does not believe that practical sterility can be obtained by the mechanical method alone, and he disapproves of bichloride of mercury in solution, because of the laboratory experiments of Leedom-Green and Opitz, who were able to culture staphylococci after appreciable exposure to this agent. He advocates the use of unpurified clove oil and seems very enthusiastic in reference to its virtues. We have never had any experience with this agent, but in common with a large number of others we are in a position to judge as to the practical value of bichloride of mercury, and we can only say that whatever may be the laboratory judgment, we believe that the results of numberless operations throughout the world have at least shown its practical utility. In this chapter upon technique the author has also included a very complete description of the vaginal method of attack, and he closes the chapter with an account of anesthesia, stating his belief in the employment of local agents whenever possible.

The consideration of the affections of the peritoneum is prefaced by a discussion of the etiology of acute general peritonitis in which is incorporated a considerable account of the experimental work which has been done upon this subject, thus rendering the chapter of particular value. Pelvic lacerations are to be repaired at the conclusion of labor, unless there are distinct contraindications, in which event a period of two months should be allowed to elapse before anything is done. We confess that we do not understand the rationale of this method. It has been well established that operative procedures to repair the injuries incident to labor are well borne, and that the results are perfectly satisfactory if performed a week after the completion of parturition; indeed, some operators are so wedded to this period that they will not repair these injuries immediately upon the completion of labor, but prefer to await the seventh day before doing any repair. In view of this fact we therefore cannot see any advantage in putting the patient back to bed for two or three weeks at a time when she has just about regained her health after the lying-in period. In old cases of complete laceration the author recommends the flap-splitting method. In this we cannot agree, as we believe that the older methods give as good if not better results. Be that as it may, we feel that the author has not given a description of the operation which he advocates, which is adequate for the ordinary student; nor are we pleased with the illustrations of this particular procedure. We are also disappointed in the single procedure recommended for the repair

of cystocele. Not that it is not a method of value, but no mention has been made of other procedures which are needful in certain of the more marked cases of this injury. In considering the question of the pessary treatment in non-operable uterine prolapse we note the omission of the form designed by Menge. Certainly if the Zwanck and Hodge are noted the existence of the above-mentioned instrument should have been recognized.

In his chapter upon the diseases of the ovaries the author states that conservative operations have given him satisfaction in all but about 5 per cent. of his cases in recent years. He lays stress upon the accumulating evidence that removal of both ovaries has a decided effect upon the general metabolism of the patient. We are constrained to question whether the former statement will be consonant with the experience of the greater number of operators, but we are very glad that the author has emphasized the bad effects of castration, as we believe that even at the present day there is too great a tendency to look upon the ovaries as simple reproductive organs. We are also of the author's opinion that it is better, in a small percentage of cases, to have to reoperate than always to do a complete ovariotomy in doubtful cases, and while thus avoiding the later operation always to subject each patient to the grave changes which so frequently follow. Whether these changes are dependent or not upon the loss of some unknown ovarian influence makes no practical difference, as the effects are so often in evidence, whatever be the cause. We congratulate the author upon his presentation of the gross cystic diseases of the ovaries with which this chapter closes.

The consideration of the diseased conditions of the Fallopian tubes is fully up to the standard set by the rest of the book, but we do not think that the illustration depicting the evacuation of an abscess in the cul-de-sac is well executed, as the direction of the incision is too far posterior and away from the cervix. In the chapter dealing with metritis of an acute variety in connection with labor or abortion, we feel that it would have been of advantage had the value of the examination of the blood in obscure cases been insisted upon as an aid to diagnosis, and also that in describing the method of intra-uterine culture there should have been an explanation of the limitations of the method. We are delighted at the clearness of the teaching in regard to the dangers of the curette and the slight value of intra-uterine douches in these cases, while, on the other hand, the importance of ergot and the value of intra-uterine application of formalin is well emphasized. We feel it to be possible that the future may show that the author has been a little too skeptical with regard to the benefit to be gained from the use of the anti-streptococcic serum.

We are particularly pleased with the chapter dealing with the displacements of the uterus; it is thorough and due credit is given the various operations which have been devised. To meet the indi-

cations for ventrosuspension or the Alexander operation the author advises that the round ligaments be utilized, anchoring them to the posterior uterine surface without cutting them. He would more stringently limit the indications for the Alexander operation than is usual among those operators who depend upon the round ligaments for operative correction; we believe this to be a wise attitude. We would call particular attention to the chapter of fifty pages upon the fibromyomas of the uterus. For this chapter there can be nothing but praise.

Our only criticism of the chapter upon extra-uterine pregnancy is that the treatment of advanced cases has been slighted, being too fragmentary and uncertain in tone to be of any great value. While, of course, the rarity of this condition makes this omission of little actual importance, it seems that a more definite teaching would be in place if the subject is to be mentioned at all.

Several extremely interesting pages are devoted to the appendix in relation to pelvic disease. The author does not admit the existence of the ligament of Claudo, for which we thank him, and he believes that while the appendix may be diseased at the same time with, but independently of, the pelvic structures, its pathological condition may be either consequent to or a cause of pelvic disease. This pathological relationship is occasioned by contiguity and not by lymphatic transmisson. The scientific scope of the whole book is well typified by the consideration of the white cells in their relation to infectious processes, and embodies the best recent work upon the subject. Enteroptosis is considered in a very conservative and satisfactory manner, but we think that more space should have been given to the operative treatment for the condition. The last chapter, that upon sterility in the female, begins with a statement which we confess we do not understand. The illustrations are, as a rule, of marked excellence, though some are marred by a too diagrammatic tendency, and we notice with pleasure that, although they are ample for all needful elucidation, there is a grateful departure from certain recent gynecological picture books.

As a whole the volume is one of the most praiseworthy of which we have any knowledge. It does not claim to be a purely operative manual, and yet with the few exceptions which we have noted it gives ample space to the description of the methods which the author has proved in his own work. Moreover it is well written, and is therefore very readable—a desideratum not always attained in medical works. Finally it is a gynecology in the strict sense of the term, treating diseases only which are peculiar to women; it does not attempt to enter the domain of general surgery by describing operative procedures, as nephropexy, appendectomy etc., which, often demanded as they are in conjunction with pelvic operations, cannot, strictly speaking, be considered as within its scope. We believe that this limitation, which in some quarters may be con-

sidered as an omission, is praiseworthy, as we are still of the opinion that gynecology is worthy of a place among the specialties and that there have been too many attempts to fuse it with general abdominal surgery. W. R. N.

CLINICAL DIAGNOSIS. A TEXT-BOOK OF CLINICAL MICROSCOPY AND CLINICAL CHEMISTRY FOR MEDICAL STUDENTS, LABORATORY WORKERS, AND PRACTITIONERS OF MEDICINE. By CHARLES PHILLIPS EMERSON, A.B., M.D., Associate in Medicine, Johns Hopkins University, Baltimore, Maryland, with an introduction by WM. OSLER, M.D. Pp. 641; 126 illustrations; 6 colored plates. Philadelphia and London: J. B. Lippincott & Co.

THE essential function of a book on this subject is to provide a complete and absolutely accurate description of the methods that are useful to the clinician and the clinical laboratory worker, and to give a critical discussion of the relative value of each method and of the value or lack of value of the results so far as they bear upon diagnosis. It was to be expected that no one in this country would produce a more satisfactory book of this kind than the author of this one, because of his extensive experience in teaching these subjects and his wide training in various lines bearing upon such matters. In some ways this expectation has been realized; in others, it has not.

The chief failure in the book is, unfortunately, the most important one, namely: there are many inaccuracies in it; and, there being many such, it must be very difficult for anyone using the book to be able to determine upon which methods he can rely, as they are here given, and upon which he cannot rely. The obscurities and errors are at times such that it is impossible to believe that the author himself would deliberately stand sponser for them; and they must have slipped in accidentally, in proof-reading or in some other manner, in the process of making the book. Some of them are comparatively trivial; as, for instance, the statement that poikilocytosis is a change in the size or shape of the red blood corpuscles. Others of them are much more important, as they may readily lead to serious errors or omissions in carrying out methods. This is particularly true of a number of the chemical methods described. For example, it tells one nothing to say simply that a safety tube is used in Folin's method for urea when it is really a special safety tube. Further, Folin directs that the solution be not allowed to remain alkaline, while the description in this book says it must remain alkaline; again, the book tells one to continue heating for a half hour, while Folin stated, five years ago, that this is not long enough; and what does it mean to say that it is distilled until the ammonia is "almost all over?"

Except for this disadvantage, which, however, is sufficiently important to deserve the emphasis that has been placed upon it, the book is, in most ways, very satisfactory; and in some essential things, extremely so. It suffers from a somewhat involved and obscure style of stating facts, but it has the very marked advantage of evincing a close acquaintance with the large number of methods in use, a critical sense of the value or lack of value of the various methods, and a critical conception, likewise, of the importance or lack of importance of the results to the clinician. The latter point is illustrated in the discussion of the tests of the functional capacity of the kidneys. R. L. C.

THE COMMON BACTERIAL INFECTIONS OF THE DIGESTIVE TRACT. By C. A. HERTER, M.D., Professor of Pharmacology and Therapeutics in Columbia University, New York. Pp. 360. New York: The Macmillan Company, 1907.

WHEN we realize that bacteria form a fifth to a third part of human feces by actual weight, we appreciate the important part that microörganisms must play in the intestine. Unfortunately former observers have been altogether too ready to assume that this bacterial activity must be deleterious to the organism, whereas later investigations tend to show that a certain number of bacteria are necessary for the normal functions of the bowel. This mistaken conception of the significance of the intestinal microörganisms has caused a cloud of false hypotheses to arise about the subject of intestinal auto-intoxication, giving it a very undue prominence in the causation of disease. Most obscure conditions at one time or another have been ascribed to auto-intoxication without any scientific basis. The best way to set right such a mass of mistaken ideas is not only by ruthlessly trimming away wrong conceptions, but by giving us in their stead the real facts and showing how much truth there may be in auto-intoxication as a cause of disease, even though the whole subject is not yet capable of mathematical demonstration. This is what Dr. Herter does in the volume under consideration. The title "Bacterial Infections" is not a misnomer, but rather an understatement of the scope of the book. He not only considers infections, but also the whole subject of the relations which the intestinal flora has been shown to bear to digestion, to auto-intoxication, and to infection. The methods of investigations are very completely given, and there are chapters upon the comparative flora of herbivora and carnivora. Clinical sections upon the types of chronic excessive intestinal putrefaction and the methods relating to its control complete the volume.

The author is peculiarly fitted to write such a work, since he is at

once an investigator, a clinician, and a teacher of therapeutics. The result of his labor is to be recommended to everyone who wishes to understand all that we know of the bacterial processes in the intestine, and surely no branch of pathological physiology is more important. J. D. S.

A Manual of Normal Histology and Organography. By Charles Hill, Ph.D., M.D., Assistant Professor of Histology and Embryology in the Northwestern University Medical School, Chicago. Pp. 463. Philadelphia and London: W. B. Saunders Co., 1906.

The value of even the best manuals of histology, of pathology, or of similar subjects is, of necessity, limited; and their usefulness to a student must depend upon the accuracy and vividness of the illustrations and the lucidity of the text. Of a manual of histology this is eminently true, for the author is confined, in a general way, to the objective description of the microscopic appearance of cells, tissues, and organs. Dr. Hill's arrangement of his book is much the same as is followed in other short manuals of histology, but he develops his chapters in a jerky and confusing manner, referring now and again to surgery, therapeutics, pathology, physiology, and clinical medicine. These references are not only confusing and ill-timed, but frequently inaccurate. Even to refer to the physiology of the liver by the statement that "The function of these cells [liver cells] is twofold: (1) to secrete bile into the bile capillaries; and (2) receive and contribute sugar to the blood capillaries," is unfortunate.

We regret to say that the illustrations aid but little. Those which are reprinted from other books are often well chosen, but many of the original cuts are inexcusably poor, while some convey no impression whatsoever. The most useful part of the book is the section upon the teeth. This is developed in greater detail than any other subject, and covers half of the chapter on the digestive system.

W. T. L.

PROGRESS
OF
MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF
WILLIAM OSLER, M.D.,
REGIUS PROFESSOR OF MEDICINE, OXFORD UNIVERSITY, ENGLAND,
AND
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The Origin of Renal Hemorrhages in Nephritis.—KUSUMATO (*Arch. f. klin. Med.*, 1907, lxxxix, 405). Askinazy has laid stress upon the not infrequent occurrence of hemorrhage in cases of chronic nephritis. In several of the cases postmortem examination showed that the bleeding came from the renal pelves. Kusumato reports a similar case. A man, aged fifty-five years, presenting a typical clinical picture of chronic interstitial nephritis had on a number of occasions quite marked hematuria. The first bleeding occurred in conjunction with a transient hemiplegia coming on while straining at stool and the last with a fatal apoplectic attack. Careful microscopic examination of the renal pelves showed three extensive submucous blood extravasations which could be definitely traced to small ruptured veins. The accompanying illustrations are quite conclusive, and the point is of importance, as such hemorrhages are usually ascribed to diapedesis. Israel has suggested that the bleeding may be due to a sudden arterial hyperemia, basing his view upon observations made during operations. Kusumato points out that during unusual exertion, such as straining at stool, there is increased arterial tension and at the same time venous congestion, both factors probably being of importance in causing the rupture of the veins.

Paroxysmal Tachycardia.—E. SCHMOLL (*Arch. f. klin. Med.*, 1907, lxxxix, 594). There are at present two views regarding the nature of tachycardia. Hoffman has called attention to the frequent occurrence of a doubling or quadrupling of the previous pulse rate and assumes that the impulses at their point of origin are sent out much more rapidly than the heart is normally able to respond. Owing to some change

in irritability during the attacks of tachycardia two or even four times as many impulses may pass through. According to Mackenzie the condition depends upon a heaping of extra systoles. Schmoll reports two interesting cases with careful analysis of the pulse tracings. In the first case the normal auricular impulse is shown on the venous tracing, but during an attack is replaced by a ventricular venous pulse. Tracings taken during intervals give an explanation of this phenomenon. Certain irregularities can be interpreted only as extra systoles and the absense of an auricular impulse before these contractions mark them as ventricular extra systoles. The disturbance of rhythm, the absence of the compensatory pause, and the occasional occurrence of atrioventricular extra systoles with shortened auriculoventricular pause indicate the bundle of His as their point of origin. In the second case during attacks there was often a typical pulsus alternans, an alternating strong and weak contraction of the auricle as well as of the ventricle and the two occurring independently. The interpretation of the tracings is rendered difficult by the occurrence of abortive extra systoles. A slight wave of the auricular contraction is recorded without a succeeding ventricular wave, but auscultation shows that a contraction does occur. As in the first case these extra systoles are not followed by a compensatory pause and the time of transmission of the impulse from the auricle to the ventricle is shortened. Here then are two cases of tachycardia depending upon the occurrence of extra systoles which probably arise in the bundle of His

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Sodium Chloride Metabolism.—Bittorf and Jochman (*Arch. f. klin. Med.*, 1907, lxxxix, 485) have studied the metabolism of sodium chloride and its relation to water excretion in a large number of pathological conditions. Considering the importance which has been laid upon sodium chloride retention as a cause of œdema their contribution is of considerable value. Among the infectious diseases they have investigated lobar pneumonia and find that the chloride retention is due not to a primary retention of water, but to a marked affinity of the pneumonic exudate for salt, the organism being able to react during increasing consolidation by an increased elimination of water, while the salt excretion is reduced. They were unable to influence the chloride output by the administration of 15 grams of salt. In cases of acute exudative inflammation, such as pleurisy, the chloride output may be normal and the administration of large amounts of salt need not lead to a chloride retention. There is not even a delayed excretion of the salt, and indeed it may exercise a diuretic action and stimulate a further chloride excretion. After exploratory puncture there may be an increased sodium chloride excretion due to absorption from the exudate. Diuretin increases the water output but has no influence upon the salt.

In heart cases and in cases of chronic nephritis complicated with broken cardiac compensation the elimination of water and salt depends entirely upon the circulatory condition. The two substances bear no definite relation to one another and each may be influenced quite independently of the other. Even in the presence of œdema a considerable intake of salt need not lead to water retention; indeed, in some instances it acts as an efficient diuretic.

In nephritis, conditions are found to vary. In an instance of acute

nephritis with œdema administration of salt led to increased salt and water excretion, while at a later period when the œdema had cleared up it was followed by profuse water elimination but retarded salt elimination. In chronic parenchymatous nephritis the same patient may show at intervals very good, good, or delayed salt excretion with normal water elimination. In one instance sodium chloride administration displayed a marked diuretic action carrying with it an excess of salt. As a rule, in chronic interstitial nephritis there is also good capacity for sodium chloride elimination. In some instances there was good salt elimination with poor accommodation for increased water output. In other instances both were deficient. The chloride content of non-nephritic exudates, transudates, and œdemas is often higher than those of nephritis.

From these observations Bittorf and Jochman conclude that one is unable to judge of the severity or character of a renal lesion by the capacity for eliminating chlorides; that salt retention is not the primary cause of œdema, changes in the bloodvessels being a far more important factor; that sodium chloride may be administered without any harmful consequences; and that the modern demand for a salt-free diet based upon the assumption of a diminished capacity for salt elimination is without scientific foundation.

The Action of Dechloridation upon Bradycardia and its Interpretation According to the Myogenic Theory of the Heart Beat.—ENRIQUEZ and AMBARD (*La semaine méd.*, 1907, No. 4, 40) have been led by the reports in the literature of the beneficial effects of the deprivation of salt in bradycardia to try it in a case of their own and had very good results. In one of the reported cases the beneficial action was noted most markedly on a milk diet, the rate becoming normal, but as soon as a mixed diet was resumed the rhythm became slow again. Their patient was a woman, aged fifty-seven years, who complained of pains in the knees, dyspnœa, and dizziness. The pulse varied at first between 32 and 39 to the minute, the blood pressure was about 230 mm. of mercury. The urine contained no albumin. The patient was put on a salt-free diet and eight days afterward the pulse was 42, the dyspnœa and dizziness diminishing. At the end of seven weeks on the diet the pulse became normal (72) and the shocks of the two sounds were normal in rate and rhythm. The symptoms all ceased and the patient gained about fifteen pounds in weight. During the treatment the woman was able to do her ordinary work. Enriquez and Ambard discuss briefly the two theories as regards the heart beat (the neurogenic and the myogenic) and give brief abstracts of most of the recent work done, especially in proof of the myogenic theory and the functions of the bundle of His. The recent work on the action of solutions of salt on tissue cells is reviewed: their toxicity, aside from the effects of osmosis, seems to be directly injurious to the musculature and independent of the innervation. The results of deprivation of salt in bradycardia seems to bear out these conceptions. It is rather interesting that the heart in this case passed through the different stages of arrhythmia in slowly increasing to the normal rate which the heart in Erlanger's experiments on compression of the bundle of His showed, but in the reverse order. In conclusion they say "The effect of dechloridation upon slow pulse agrees perfectly with the myogenic theory, and the analysis of the

pathogenic condition, the slow pulse, shows us a curious and hitherto unique fact of the injurious action of chlorides upon a diseased muscle without any intervention of the nervous system."

Stokes-Adams' Disease due to a Sclerogummatous Lesion of the Bundle of His.—VAQUEZ and ESMEIN (*La presse méd.*, 1907, No. 8, 57) first give a detailed account of the physiology of the heart with many references to the literature, as regards the neurogenic and myogenic theory of the heart beat, and quote from the more recent work on heart block and arrhythmias in proof of the myogenic theory. This careful review is divided into the anatomical description of the bundle of His by various authors; the experimental proofs of its relation to the heart beat by sectioning it completely and partially, and noting its effects on the pulse; and the clinical evidence in the recently reported cases of arrhythmia, bradycardia, and Stokes-Adams' disease. The following case is reported by Vaquez and Esmein as of special interest, as it was followed carefully through life with excellent pulse tracings and cardiograms, and then carefully examined at autopsy. The patient, aged forty-three years, a few months previously began to have attacks of syncope with convulsions, these gradually increasing in frequency to date of first observation. He gave a history of syphilis and had a double aortic lesion. The pulse varied from 50 to 60 to the minute, but in the syncopal attacks was as low as 30 to 60 to the minute. The attacks become very severe with convulsions and opisthotonos, and at times the pause in the pulse lasted as long as six seconds. Medication had little or no effect and the patient died in an attack after about four months of observation. On careful examination the difference between the arterial and the venous rhythm was quite marked, the jugular pulsations being well seen during the pause in the pulse. On auscultation during the pause the contractions at the base of the heart could be faintly heard. At autopsy the heart showed a double aortic lesion. Its weight was about 370 grams. The nervous system, pneumogastrics and sympathetic nerves were normal. On examining the heart a plaque of sclerosis, irregular in outline and about 2 x 3 cm. was found lying between the auricles and ventricle, just in the region of the bundle of His. Microscopically, the fibers in the bundle were found to be surrounded and compressed by the sclerotic tissue, thus giving rise by their pressure to the irregularity in the pulse and the manifestations of heart block.

An Extraordinary Blood—The Presence of Atypical Phagocytic Cells.—F. VAN NUYS (*Boston Med. and Surg. Jour.*, 1907, 156, 390) reports the history of a man aged fifty-five years whose complaint was of swollen feet and passage of a tape-worm. His family and personal history were unimportant. For six months the feet had been swollen and lately there had been some dyspnœa and weakness. Examination revealed a bronchitis and a fairly compensated aortic regurgitation. The liver and spleen were quite large, the former reaching three inches below the costal margin and the latter nearly to the umbilicus. In the region of the descending colon were two egg-shaped hard masses which did not wholly disappear after the bowels were thoroughly moved. There was some œdema of the feet and bases of the lungs. On treatment a beef tape-worm was passed some hours after admission. No blood was

found in the stools. Eggs of Tricocephalus dispar were always present. Urine and sputum were negative.

The blood was examined on account of the peculiar features, and control counts were made from both ears and fingers. Daily and weekly control differential counts were also made. The number of leukocytes varied greatly from time to time. During the stay in the hospital the patient had a short attack of erysipelas after which there was a fall in the number of leukocytes to below normal. He left the hospital in about the same condition as on admission and died a few hours afterward. No autopsy was obtainable.

The characteristic features of the blood were the presence of large basophilic phagocytic cells capable of amœboid movements and very different from any previous cells described in the blood. (These are shown very well in the plates.) There were two varieties of these cells: first, large mononuclears with granular and vacuolated cytoplasm and with large well-stained, oval nuclei. These cells occur in plaques resembling endothelium. They were actively phagocytic and had a chemiotactic influence on the leukocytes. Very rarely red cells or lymphocytes were enclosed. Their average size was 23 x 16.9 μ. The other type was a large multinuclear phagocytic giant cell with long fantastic streamers of protoplasm. The nuclei were the same as in the other variety. The cell membrane was hard to determine. Between these extremes there were many cells having the characteristics of both. These giant cells were apparently long-lived and showed leukocytes in various stages of decomposition inside them. These abnormal cells varied enormously in numbers from day to day, at one time being being about 40 per cent. in a count of 1000 cells. After the erysipelas they almost disappeared but began to recur shortly before death.

In classifying them as basophilic they come under the same heading as lymphocytes and transitional cells. At no time were eosinophiles, mast cells, or myelocytes seen. Normoblasts were rare. There was no polychromatophilia and only slight poikilocytosis and a moderate achromia of the red cells. The specific gravity of the blood was 1044; the coagulation time about five and a half minutes. Blood platelets were twice counted; once they were 391,700 per c.mm. and once 276,000. The red cells varied from 2,500,000 to 4,000,000. The whites were very irregular in numbers, reaching as high as 100,000 and as low as 5000. Experiments tended to show that there was an absence of digestive ferment in the cells, such as myelocytes are said to possess in myelogenous leukemia; hence it is probable that these cells did not come from a tumor of the bone marrow. There was no albumose in the urine. Van Nuys concludes that the morphology and plaque formation suggest that they are endothelial in origin. Undoubtedly, somewhere in the man's body a neoplasm was setting loose these cells into the blood. If the phagocytes arrived in the blood stream by way of the lymph channels we might expect the inclusions to be lymphocytes. The enlarged spleen and the mysterious abdominal lumps possibly held the secret. The case might be considered leukemia, meaning by this a malignant disease of the blood.

A study of an additional case in the wards at present with a similar blood picture will be reported later and may help to clear up this peculiar condition.

Cor Triloculare Biatrium.—J. D. MANN (*Brit. Med. Jour.*, 1907, 1, 614) reports on this unique case of three-chambered heart in a man aged thirty-five years, who appeared to have some chronic heart disease with the usual symptoms. He was dyspnœic, but not cyanosed, nor were the fingers clubbed. The area of cardiac dulness was increased and the cardiac impulse more extensive than usual. There was no thrill, but there was a loud, rough, systolic murmur over the whole cardiac area. Later, before death, the patient became very cyanotic, the heart was tumultuous and irregular, and there was general œdema. At autopsy there was found to be a complete absence of the septum between the ventricles, and the walls were of equal thickness. Into the common ventricle opened the mitral and tricuspid orifices in their normal positions. Two arterial trunks emerged from the ventricle in the position of the aorta and pulmonary artery, the valves being somewhat sclerosed; the auricles were normal excepting for a patent foramen ovale. The most interesting point is the age of the patient as these cases are extremely rare even in childhood, and this was a man who was little inconvenienced by his cardiac condition until his last illness. As a youth he was rarely sick and only at times dyspnœic. He was never cyanosed until the last three weeks of his life.

Mann then gives brief summaries of cases in the literature reaching adult life, and discusses the question of the circulation in such cases and the cause of congenital cyanosis and polycythemia.

In conclusion, he says that the conditions which give rise to the cyanosis in cardiac malformations remain obscure. In addition, however, to the results that are directly due to the action of the malformed heart on the blood current (mixture of venous and arterial blood), it appears probable that a permanently dilated vascular system shares in the production of the cyanosis.

SURGERY.

UNDER THE CHARGE OF

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The Employment of the X-rays for Locating the Position of the Accessory Sinuses of the Nose and the Diagnosis of their Diseases.—GOLDMANN and KILLIAN (*Beit. z. klin. Chir.*, 1907, xliv, 1)) say that the outspoken view of Scheier in 1897, concerning the value of the *x*-rays in the domain of rhinolaryngology, has been rapidly established. The accessory cavities of the nose have given particular trouble. In the earlier efforts the lateral exposure of the skull to the rays was almost exclusively

employed, because little faith was placed in the anteroposterior exposure. Goldmann and Killian had their attention first attracted to the value of the lateral exposure by the opportunity of observing the excellent results obtained by Professor Hagler in Basel, who secured very clear skiagrams of the frontal and maxillary sinuses. Their first efforts were directed toward showing the normal frontal sinuses, from which they became convinced that the lateral exposure gave the best obtainable result. By this method it could be decided with certainty whether or not the frontal sinus was present. This was proved in a case in which probing could not detect the presence of the sinus. The *x*-ray plate showed practically no sinus, which was confirmed later by operation. With much clearness it can be shown whether the sinuses are equally or unequally developed, or whether a septum completely divides the two sides. It shows also how its different loculi are shaped and the size of the sinus. These facts are of much value in connection with operations on the sinus. A lateral exposure would not determine the side involved, since both cavities would then lie over each other. An anteroposterior view would permit a comparison between the affected and the non-affected sides of the frontal, ethmoidal, and maxillary sinuses. A purulent collection on one side can thus be recognized, since that side would be considerably darker than the other. One side may be slightly obscured from a swollen, degenerated mucous membrane or to a less extent from an œdematous mucosa. Only a deep shadow permits a positive diagnosis. When both sides are darkened the interpretation is more difficult, although one side may show a deeper shadow than the other. While the presence of a marked obscurity on both sides permits the diagnosis of double-sided disease, the absence of such obscurity does not positively exclude disease on both sides. In the cases reported almost without exception a darkening on one side in the region of the ethmoidal cells proved at operation to be due to disease in these cells. While Goldmann and Killian strongly prefer exposure in the sagittal plane they do not reject the lateral exposure entirely, but employ it sometimes to supplement the other. They claim that the anteroposterior exposure to the rays is an especially valuable method of establishing the topographico-anatomical relations of the accessory sinuses and their diseases. It should be classed as an equivalent with the other methods of examination, serving to substantiate their findings and making them not indispensable.

The Treatment of Gangrenous Herniæ.—Hesse (*Beit. z. klin. Chir.*, 1907, xliv, 172) says that the treatment of gangrenous strangulated herniæ has varied for the past thirty years, chiefly between the making of an artificial anus and primary resection with reunion of the divided ends. Mickulicz and Kocher favor primary resection; Bramann favors the artificial anus. Hesse says that the review of a large mass of statistical material gives convincing evidence that resection is recognized as the best treatment for gangrenous herniæ. There is much diversity of opinion as to the indications for the operation. Lotheissen, for example, prefers an artificial anus if there is the least sign of peritonitis; Barker likewise in old and desperate cases; others consider advancing decay as a contra-indication. Of 197 cases of incarcerated hernia coming to operation in the Tübingen Clinic, in 56 there was a suspicion

of gangrene, or 23.34 per cent. Of these 56 primary resection was performed on 40 cases, with a mortality of 47.5 per cent; and on 3 the operation for artificial anus was done, with a mortality of 100 per cent. Of the 56 patients, 33, or 58.9 per cent., died. Peterson's results in the Heidelberg Clinic, from 1901 to 1905, showed 8 deaths in 24 cases of primary resection and 7 deaths in 8 cases of artificial anus. In a total of 860 cases of primary resection for gangrenous hernia collected from the literature 382 died, a mortality of 44 per cent., and of 604 cases in which an artificial anus was made, 431 died, a mortality of 71.3 per cent.

With regard to the question as to the relative value of local and general anesthesia, Hesse says that as a rule the local is to be preferred, although it has a more serious influence on the mental condition than general anesthesia. The danger of shock with local anesthesia is considerable, and the psychical influence interferes with heart action quite as much as chloroform or ether. Hesse concludes from his extensive study that there is only one rational treatment for gangrenous hernia, the complete resection of the gangrenous portion of the intestine, while the artificial anus as a life-saving operation should no longer be given consideration.

The Etiology of Lateral Abdominal Herniæ.—BLAUEL (*Beit. z. klin. Chir.*, 1907, xliv, 229) defines these herniæ, according to Graser, as those coming through the abdominal wall in the linea semicircularis or the oblique muscles, or the tendinous expansions of the latter. This definition excludes those coming through posterior to the oblique muscles, the herniæ of the loin. Our knowledge of the causation of these herniæ has received important contributions from Quervain, Borchadt, and v. Baracz, each of whom reported a case. Before the classic work of Schmidt, only wounds and suppurative conditions were recognized as causes. Then Wyss showed that hereditary defects of the muscles were responsible for congenital cases, which permitted the above authors to show that muscular atrophy could be a cause. In such cases there is a circumscribed ectasia of the abdominal wall, but no essential hernial sac or ring. Borchadt called them pseudoherniæ. Baracz and Blauel accept this term, which should be reserved for those cases resulting from an atrophy of the muscles. Baracz attributed the atrophy to a spinal disease and its associated paralysis. Quervain discussed the etiology exhaustively and concluded that only the influence of the nervous system would explain it. In the case which he reported the atrophic region was supplied by the anterior branch of the twelfth intercostal nerve. In the most recent text-books of surgery the question of the causation of these herniæ from muscular atrophy is left open. Blauel reports a fourth case in which the symptoms of pseudohernia were the same as in the other three, already referred to. In recumbency and easy respiration nothing especially protruded. With intra-abdominal pressure a localized, semiglobular tumor protruded, at the edges of which could be felt a well-defined deficiency in the abdominal wall. With disappearance of the intra-abdominal pressure and the tumor, the edges of the deficiency in the abdominal muscles were soft and yielding. Electricity showed a degenerative atrophy of the muscles on the right side of the abdomen. The cause in this case was definitely shown to be an anterior acute poliomyelitis, of which there was marked

evidence in the paralysis of the right lower extremity. This is the first case in surgical literature in which this cause has been definitely shown to be present, although four cases have been reported in the neurological literature by Ibrahain and Hermann. Another case has been reported of isolated partial paralysis of the abdominal muscles from this cause, without, however, the signs of a lateral abdominal hernia. Blauel believes that acute anterior poliomyelitis is the usual cause of lateral abdominal pseudoherniæ.

A Study of Some Points Concerning Urinary Troubles in Retroversion of the Gravid Uterus.—TRILLAT (*Annales des maladies des organes génito-urinaires*, 1907, xxv, 561) says that he desires to call attention to the mechanism of retention of urine, the explanation of the correction of retroversion by the simple evacuating catheter, and the particular significance of Laroyenne's symptom, micturition from feeble pressure upon the posterior inferior part of the vagina. He found by his investigations that the uterine neck was 7 cm. above the upper border of the symphysis, which he considers an important point in cases of great distention of the bladder. The urethra attains a length of 8 to 9 cm., nearly three times the normal. From the urethra to the upper end of the cervix uteri measured 7 cm., the bladder in this portion forming what he calls the vesical infundibulum. The cervix pushing forward into the bladder increases the length of the urethra by the formation of this infundibulum. While complete incarceration of the uterus in the pelvis gives severe vesical conditions, a partial incarceration can also give grave phenomena. The retention of urine has been accounted for in various ways by different authorities, such as curvation of the urethra, diminution of the calibre by elongation, œdema of the uterine neck, paralysis of the vesical muscle, and direct pressure of the cervix on the urethra and neck of the bladder. Trillat believes that the obstruction is due to the pressure forward of the cervix from the retroversion against the lower part of the bladder, the infundibulum, occluding its cavity. If light pressure is made with the finger in the posterior vault of the vagina against the retroverted uterus urine will escape from the urethra. If the pressure is removed the escape of urine will cease. Trillat says that the establishment of this symptom alone should make one think of retroversion of the gravid uterus, and thus a dangerous error and its consequences be avoided. Laroyenne believed that the finger pressed on a prolongation of the bladder behind the uterus. Trillat says that it is impossible to admit this with a gravid uterus after the fourth month, when the troubles begin, since there would be no room for such a prolongation. The escape of urine he thinks, is due to the removal of the obstacle to the outflow of urine, produced by pushing the body of the uterus forward, thus relieving the pressure of the cervix against the lower part of the bladder or infundibulum.

A Case of Pressure on the Trachea.—HALL (*Lancet*, 1907, i, 1079) reports such a case, which at first had been treated for symptoms of influenza. This cleared up in a week sufficiently to permit the patient to go to work. A fortnight later he was treated again, this time for asthma. Two months after the beginning of the trouble he had to be propped up in

bed; he was somewhat cyanosed, with a pulse of 150 and very feeble. Examination of the larynx and chest showed little evidence of air entering or leaving the chest, evidently the result of some obstacle in the respiratory passages. The laryngoscopic examination excluded obstruction of the glottis, and the absence of amelioration from time to time excluded spasm of the smaller bronchi as in asthma. As both lungs were equally affected, the probability was in favor of tracheal stenosis. At the necropsy a mass of enlarged glands was found compressing the trachea, just at its bifurcation. A microscopic examination showed it to be lymphosarcomatous. The rapidity with which the compression of the trachea developed was very interesting. In the beginning of January, though weak from his recent attack of influenza, he was otherwise well, and yet on the following February 19, he was found to be suffering from severe dyspnœa.

Observations on the Operative Treatment of Muscular Wryneck.—Böcker (*Zentralbl. f. Chir.*, 1907, xxxiv, 449) reports the results of the operative treatment of torticollis in Hoffa's clinic. Of the many methods of operative treatment proposed, only two, in his opinion, deserve to be considered: the simple tenotomy of the sternomastoid of Volkman and the partial resection of Mickulicz. Doering reproted 35 cases with good results in all except 1, from division of the stretched fibers of the cucullaris with abundant overcorrection, and considers this the proper treatment for all cases, mild and severe. Böcker reports good final results from this method in mild and early cases. He reports that since 1898, 120 cases have been operated on, 90 by the Mickulicz and 30 by the Volkman method. When the final results are compared the Mickulicz operation is found to give the best. Böcker has observed participation of the scaleni in only 2 cases, which were cut. While he did not meet with a failure by the Mickulicz method, the results from the Volkman operation, in spite of exact after-treatment and the wearing of a cervical collar in the severe cases, have not always been satisfactory. These poor results are due to the difficulties experienced in finding and removing the adhesions of the muscles to the surrounding parts and the deep-lying bands; and leads to the preference for the Mickulicz operation. The latter is simple in technique and exposes far better all deep-resisting structures, while it requires only a short after-treatment. Only a small wound is necessary and an extensive and deforming scar is avoided, so that the cosmetic effect is little worse than by the Volkman method. With the correction of the torticollis the cervical scoliosis which is frequently associated slowly disappears from the overcorrection. Only the worst cases will not be influenced. The Mickulicz operation is now employed in Hoffa's clinic, not only in the severe cases, but in the mild as well. It gives the surest and most complete success.

The Operative Treatment of Muscular Torticollis. An Answer to Dr. Doering of Gottingen.—Gerdes (*Zentralbl. f. Chir.*, 1907, xxxiv, 451, says that Doering's criticism of his (Gerdes) division of the scalenus in torticollis calls for a reply. That repeated occurrences have been observed after open tenotomy of the sternomastoid permits no serious doubt. The danger of recurrence and difficulty in the after treat-

ment are the chief reasons for recommending the Mickulicz extirpation of the sternomastoid which is affected. Unfortunately this operation does not positively remove the danger of recurrence and has the disadvantages of a poor cosmetic effect. Lorenz considers tenotomy of the sternomastoid as a preliminary to the correction of a cervical scoliosis. How great the resistance to such a correction may be is shown by the fact that Lorenz took a half-hour to accomplish it in a rigid case, after a Volkman operation. In the majority of cases the resistance is due to the contracted muscles. Gerdes proposed to cut the anterior scalene, which is the most shortened of the muscles under consideration. This is a more rational procedure than a bloodless correction. After this tenotomy the correction is easily accomplished. Doering in his 37 cases did not bring the scalenus anticus muscle into the field in any case. The technique of tenotomy of this muscle is not difficult, as Doering maintains, but very simple, as everyone knows who has once performed the operation. Gerdes believes that when his operation is properly understood, because of its simplicity, it will be preferred for the moderate and mild cases. It renders particular after-treatment unnecessary and prevents recurrences more surely than simple tenotomy of the sternomastoid.

A Series of Cases of Goitre Removed under Cocaine Anesthesia.—THOMAS (*Lancet*, 1907, i, 1143) says that ordinary goitres are fairly common throughout Wales and Monmouthshire, in England. In some counties they occur with great frequency, while in three counties they are rarely met with. In response to a circular letter 231 replies were received. One reply stated that in contrast to the common occurrence of goitres thirty years ago, they had, since the construction of the new water-works in his district, practically disappeared. Similar replies were received from other parts. A somewhat similar result from a changed water supply was shown in one family by removal from one district to another. The writer has operated on 55 cases under local anesthesia (cocaine 1 per cent.), including 4 cases of Graves' disease, and 1 case without anesthesia, without any mortality. Of 17 cases operated on under general anesthesia, including 5 cases of Graves' disease, 1 died from respiratory difficulties, 1 from hyperthyroidism (both Graves' disease), and 1 from sepsis. Thomas employs Kocher's collar incision. This was first outlined by a faint incision, along which one to two drams of a 1 per cent. solution of cocaine was injected by means of a Kocher syringe, from one end to the other of the incision, so as to form a continuous ridge. In order to cause as little deformity as possible, every divided muscle must be carefully reunited, the skin sewed by a very fine needle, and, lastly, the drainage tube and the skin sutures removed at the end of eighteen to twenty-four hours. Patients are allowed up on the third day and to go home on the sixth day.

THERAPEUTICS.

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The Treatment of Infantile Diarrhœa.—PERRET (*La quinzaine thérap.*, 1907, vi, 450) advises careful feeding and intestinal irrigations with boiled water, 0.02 per cent. boric acid or naphthol solution, or normal saline solution. The irrigations facilitate the elimination of toxic substances from the intestine and supply the loss of the body fluids caused by the diarrhœa. During irrigation the child should be upon its right side; a soft, rubber catheter should be used and the receptacle of the fountain syringe, through which the lavage is given, should be elevated not more than five or six inches above the patient. The quantity employed should be from one pint to one quart and the fluid should be cold if the patient's temperature is elevated, hot if the latter is subnormal. As an intestinal antiseptic, three powders consisting each of 5 grains of bismuth salicylate and 2½ grains of benzonaphthol may be given daily. Lactic acid should not be prescribed if the patient is taking milk. If the child is less than one year old he may take a teaspoonful of the following mixture every half hour: lactic acid, 3 parts; quince syrup, 25 parts; distilled water, 100 parts. If older than one year dessertspoonful doses may be given. Bismuth in a mixture containing soluble bismuth phosphate, 2 parts; simple syrup, 10 parts; distilled water 90 parts may act well; the dose is one teaspoonful every hour. If vomiting is present, gastric lavage may be indicated. Injections of artificial serum are often very useful.

Prevention of the Formation of Gallstones.—LANGHELD (*The Therapist*, 1907, xvii, 4) states that the reformation of gallstones can be prevented in a very simple manner by exercising pressure upon the gallbladder, through displacing the liver by about two inches, the activity of the viscus being thus considerably enhanced. The procedure is as follows: The patient, in loose clothing, sitting upright, leaning against the back of an arm-chair, places his arms on the arm-rests and takes a deep breath, holding it while counting 15, breathes out deeply and again counts 15 before inspiring again. Thus the liver is moved downward by about two inches. Undertaking the exercise for about fifteen minutes, morning, and evening is sufficient for the purpose. For those who have suffered from cholelithiasis it is wise to continue the measure permanently.

The Most Recent Treatments of Erysipelas.—HECHT (*Therap. Monats.*, 1907, xxi, 23) recommends the following methods of treatment: (1) Absolute alcohol is the most serviceable of the older agents, especially when a dressing which excludes the air can be applied, on the extremities for instance. (2) Salokrol and mesotan. These agents act well and may be employed if absolute alcohol is objected to by the patient. (3) Phenolcamphor has been warmly advocated. This consists of a mixture of liquid phenol, 30 parts; camphor, 60 parts; and spiritus vini 10 parts, and is a clear non-caustic fluid. Early in the infection it may be painted upon the affected part, later it may be applied upon gauze as a dressing. (4) A mixture of ichthyol, guaiacol, and oleum terebinthinæ 10 parts of each, spiritus vini 20 parts, acts as an antiphlogistic, an antipyretic and an analgesic, in erysipelas as well as in lymphangitis, furunculosis, etc., and also renders good service in acute rheumatic arthritis. Intravenous injections of collargol may also be employed.

The Treatment of Scar Formation Resulting from Gastric Ulcers.—EWALD (*Folia Therap.*, 1907, i, 1,) states that he has come to fear the cicatrices which follow gastric ulcers more than the causative lesion itself. The ordinary measures placed at our disposal—massage, electricity, baths, dietetic rules, etc., are worse than useless in these conditions; operative treatment has been our only resource, and by no means one certain to give permanent relief. It appears, however, that in thiosinamine we have a remedy which may possess a specific action on scar tissue. This agent is a derivative of the ethereal oil of mustard and has been repeatedly used in all postoperative troubles resulting from scar formation. Neisser has reported an instance of complete œsophageal stricture resulting from the ingestion of caustic soda which had resisted all forms of treatment for eight years in which a cure followed twenty-four injections of thiosinamine; no recurrence has occurred in nearly two years. Ewald has employed this substance in new formations of various kinds, especially benign stenoses of the œsophagus and somach and perigastric growths. In a number of patients no results were observed, but in others, subjectively, there was unmistakable improvement, while objectively there was decreased tenderness with milder symptoms, increase of weight, and ability to return to work. There was, of course, complete failure in malignant growths. An instance of gastric distortion following operation for cholecystitis and due to scar formation or pressure upon the organ by scar tissue and in which there was a palpable and tender tumor in the pyloric region was greatly benefited by injections of fibrolysine, a water-soluble combination of thiosinamine and sodium salicylate. The tenderness disappeared and other symptoms were relieved. The usual quantity injected contained 3 grains of thiosinamine to a dose. Thiosinamine itself may be injected in a mixture of 2 parts of this substance, 8 parts of glycerin, and 10 parts of distilled water.

Tincture of Strophanthus.—R. A. HATCHER (*Jour. Amer. Med. Assoc.*, 1907, xlviii, 1177) summarizes a paper, in which he discusses the advantages of strophanthus over digatalis, and cites results of experimentation with different samples of the tincture of the drug, thus: It may be stated positively that there is no difficulty in obtaining tincture

of strophanthus in the open market of quite as uniform potency as obtains in the case of tinctures of other drugs which are not standardized, and that the seeds do not undergo deterioration on being kept several years, possessing in this respect a great advantage over digitalis leaves, which deteriorate rapidly. Digitalis continues to be of very variable strength, not only for the reason just stated, but owing to want of uniformity in time of collection, methods of drying and source, even when official requirements are met. It should be remembered that the strength of the infusion of digitalis varies greatly with the manner of preparation, an infusion made from the powdered leaf more nearly representing the full potency than one made from leaves which have been merely broken up in the mortar.

Differences in the Physiological Action of an Alkaloid.—O. H. BROWN (*Jour. Amer. Med. Assoc.*, 1907, xlviii, 1241) concludes a study upon this subject with the statements that the acid with which certain alkaloids, strychnine, quinine, and morphine are combined, alter decidedly the pharmacological action of the alkaloid—at least in regard to its toxicity for paramecia (the animalcules used for experimentation). The most toxic salts of strychnine and quinine are, in some instances, at least, those which stimulate catalytic processes most markedly. The salts of morphine with the smallest degree of toxicity, in some instances, at least, are the salts of those acids, the sodium salts of which stimulate catalysis the most markedly.

The Prevention of Arteriosclerosis.—HUCHARD (*Revue de thérap.*, 1907, lxxiv, 79) considers arterial hypertension an important precursor of arterial degeneration, and holds that the prevention of the latter condition consists, in great measure, in combating the former. In lessening the tendency to excessive vascular tension many means are at our disposal, the most important of which are: diet, muscular exercise, massage—particularly abdominal and precordial massage—baths—especially carbon dioxide baths—and the high frequency electric current. Of drugs, the most useful are the nitrites, among which are classed amyl nitrite, glyceryl nitrate, erythrol tetranitrate, sodium and potassium nitrite, with theobromine to assist elimination through the kidneys. Huchard considers renal insufficiency to be a very important early symptom of early arterial sclerosis and should command our best efforts for its relief, consequently, we should reduce to a minimum the alimentary toxins which are the chief cause of this difficulty. Here diet regulation plays an important part, as it also does in lessening the tendency to excessive arterial tension. The ideal diet is one composed chiefly of vegetables and milk and one from which sodium chloride has, so far as is possible, been eliminated. Diuretics also should be employed in order to increase elimination through the kidneys and it may become necessary to sustain the heart in the struggle against the peripheral obstacles. Heart tonics usually are unnecessary before the condition is well advanced but, when indicated, the intermittent administration of digitalin is advised. In fine, the treatment of what Huchard calls "presclerosis" consists in lowering arterial tension, combating toxic conditions, and increasing renal permeability.

Calcium Salts as Stimulants in Pneumonia and Cardiac Conditions.—LAUDER BRUNTON (*Brit. Med. Jour.*, 1907, 1, 616) has prescribed these agents in pneumonia and in heart weakness of other types, and considers that the results obtained justify their further employment in threatened cardiac failure. In pneumonia he prefers to prescribe calcium chloride on account of its quick action. The dosage is from 6 to 10 grains dissolved in water, to which $\frac{1}{10}$ grain of saccharin to every 10 grains of the calcium salt has been added in order to disguise the taste. Such a dose may be given every four hours; it does not interfere with other medication which the patient may be taking. In cardiac conditions, in which a less rapid action is desired, he prefers calcium lacto- or glycerophosphate.

Creosote Carbonate in the Pneumonias of Children.—A. FLETCHER (*Canada Lancet*, 1907, xl, 497) considers that the ordinary death rate from the pneumonias of childhood (25 per cent.) may be reduced to 5 per cent. by the administration of this drug, and that we owe it to ourselves and our patients to give the agent a continued and accurate trial. The method of the action of creosote carbonate is not thoroughly understood, but Fletcher thinks that it may be carried into the blood stream unchanged and is conveyed to the cells of the lungs to be excreted. The breath is soon laden with its odor and the skin also is concerned in its elimination. It this is true it is easy to understand the benefit the drug confers for it is brought into direct contact with the tissues in which the pneumococcus is developing. The dose for a newborn infant is 1 minim per hour; for an adult, 7 to 15 minims every two, three, or four hours. No gastric disturbance is likely to follow its exhibition, and it may be given dropped on lump sugar.

Intratracheal Treatment in Pulmonary Tuberculosis.—MENDEL (*Revue thérap.*, 1907, lxxiv, 5) is very enthusiastic regarding the treatment of pulmonary tuberculosis by means of intratracheal injections of from 1 to 10 per cent. gomenol or eucalyptol in oil. Under this treatment, all the symptoms become ameliorated and the patient gains weight and strength. The method is applicable to patients afflicted with the chronic type of the affection as well as to those in the so-called pretuberculous stage. Of 200 patients in all stages of the disease, selected at random and treated by this method, Mendel reports 47 per cent. of apparent cures with return to active life; 33 per cent. of improvement, also with return to ordinary avocations, and 20 per cent. of failures; the last were individuals in the later stages of the disease. Usually the treatment must be continued for a considerable period of time.

The Comparative Antiseptic Power of Salicylic Acid and its Salts.—H. C. WOOD, JR. (*Univ. Penna. Med. Bull.*, 1907, xix, 312) concludes from a series of bacteriological experiments that the neutralization of salicylic acid, which itself is a very active germicide, by sodium or strontium greatly diminishes its bactericidal powers. This diminution is far in excess of the reduction in the amount of salicyl radical represented in the alkaline salts. It would seem that the antiseptics of the aromatic series are much more active in acid solutions. It has been shown also that the neutralization of benzoic acid gives the same results as that

of salicylic acid. These results have a bearing on the use of these substances as food preservations, both sodium benzoate and sodium subsalicylate being used to some extent as antiseptics. The latter, Wood finds to possess distinct antiseptic properties, 1 per cent. solution being sufficient to prevent the development of microörganisms.

Cotarnine Phthalate.—C. A. VON RAMDOHR (*New York Med. Jour.*, 1907, lxxxv, 438) reports upon this drug as follows: Cotarnine is a derivative of narcotine, which is a constituent of opium, and its phthalic acid salt possesses special hemostatic properties; it is a yellowish, crystalline power, easily soluble in water, and its usual dosage is ¾ of a grain in tablet form three to five times daily. Even larger doses may be prescribed, and even then there are no unpleasant sequels. The particular field of its usefulness is in the control of uterine hemorrhage, especially that occurring in connection with fibromas. It may also be employed in dysmenorrhea and in the irregular menstruation of the menopause. It is less useful postpartum. Cotarnine is believed to act upon the vasomotor nerves of the uterus rather than upon the uterine muscle. von Ramdohr reports 6 instances of persistent uterine hemorrhage in which the ordinary remedies failed; 5 of these, including 2 of obstinate bleeding after abortion, responded quickly to cotarnine phthalate. He advises the use of this agent in selected patients who refuse operation, when a uterine hemostatic is demanded and there is no necessity for a hurried uterine contraction.

PEDIATRICS.

UNDER THE CHARGE OF

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Primary Intestinal Tuberculosis in a Nursing Baby.—IRVING M. SNOW (*Arch. of Pediat.*, April 1907, 297) reports an interesting case under this title. About March 1, 1905, a girl baby was born to healthy young parents, who had an older boy, aged one year, in good health. Early in April this boy died after an illness of six days, characterized by diarrhœa, high temperature, mucous and bloody stools, and terminal convulsions. As later events showed, this illness was probably tuberculous in character. The younger baby was much nursed by the mother and thrived for two months. At this time slight irregular fever began and continued until death, June 27. About June 1, a few papules appeared on the trunk and limbs, followed later by more papules and pustules on the thigh, forehead, and chest. A week later cough and occasional respiratory distress were noted, fever continued, and the spleen began to enlarge; bronchopneumonia developed and death occured after vomiting of blood and the passage of numerous bloody stools.

The autopsy revealed miliary tuberculosis of the lungs, spleen, and

skin, caseous lymph nodes (bronchial and mesenteric), and a tuberculous ulcer of the ileum. Inoculation experiments with the mother's milk gave negative results. It was quite evident that both children were infected about the end of March, the older child dying quickly, the younger lingering for two months. Further investigation showed that the trained nurse, who had attended the mother in confinement, was at the time in poor health and coughed frequently. After a month's stay she went home and about July 1 tubercle bacilli were found in her sputum and lesions were discovered in her lungs. There can scarcely be a doubt that the nurse infected both babies by prolonged personal contact, either by kissing, sneezing, coughing, or breathing in their faces. It was also ascertained that a baby cared for by this same nurse nine months previously had recently died of bronchopneumonia.

In this case Snow believes that the avenue of infection and the primary lesion were in the digestive tract. The ileum, for about eight inches from the ileocecal valve, was firmly fixed in a mass of enlarged lymph nodes, and at this point was a circular area of ulceration of the mucosa, three quarters of an inch in width compressing the whole caliber of the intestine.

The Determination of the Caloric Value of Modified Milk.—GEORGE W. MOOREHOUSE (*Arch. of Pediat.*, February 1907, 86) gives a very simple method for estimating the caloric value of an infant's food, when the total quantity and the percentage formula are known. The method is as follows: Reduce the twenty-four hour amount to cubic centimeters, one ounce being equal to 29.5 c.c. Next determine the number of grams of fat, sugar, and proteids in the mixture by multiplying the number of cubic centimeters in the daily amount by the percentages of fat, sugar, and proteids. The calories from each constituent may be determined by remembering that a gram of fat furnishes 9.3 calories and a gram of sugar or proteid furnishes 4.1 calories. The calculation may be simplified by expressing the arithemetical processes by equations, thus: calories from fat $= Q \times 29.5 \times \frac{F}{100} \times 9.3 = Q \times F\ 2.74$; and calories from sugar and proteids $= Q \times 29.5 \times \frac{(S \times P)}{100} \times 4.1 = Q \times (S \times P) \times 1.21$. The sum of these two values gives the total calories furnished by the mixture, and this figure divided by the weight of the child in pounds gives the calories per pound per day.

In a companion paper by J. J. THOMAS (loc. cit., 82) a basis of comparison of the results obtained by Moorehouse's calculations is furnished. Quoting Finkelstein this author states that the average breast-fed infant draws daily during the first weeks of life one-fifth of its body weight; from the middle of the first to the end of the second quarter of the first year, one-sixth to one-seventh; and during the latter half of the first year, one-eighth of its body weight. Expressed in round numbers per kilo of body weight, during the first three months it draws 150 c.c.; during the second somewhat less; and during the third 120 to 130 c.c. Expressed in terms of energy quotient (Heubner), or calories per kilo, the requirement during the first three months is 100 calories per kilo (45.4 calories per pound); during the second three months, between 100 and 90 (40.9 calories per pound); during the latter half of the first year the requirement gradually sinks to 80 or a trifle below (36.4 calories per pound).

In regard to artificially-fed children, Heubner is of the opinion that the assimilation of cows' milk requires more work of the infant than breast milk, hence his energy quotient is 120. Czerny and Keller disagree with this and consider both milks equal in this respect. Finkelstein gives an energy quotient of 90 to 125 (41 to 56 calories per pound), but to be on the safe side and avoid any possible bad effects from over feeding, he prefers to use the same quotient for breast and cow's milk.

By using the calculations offered by Dr. Moorehouse it becomes a very simple matter to estimate the energy quotient of any milk modification, taken by an infant under observation, and to place the prescription of milk formulæ upon a scientific rather than a purely empirical, clinical basis.

The Vaccine Treatment of Tuberculosis in Children.—Clive Riviere (*Brit. Med. Jour.*, 1907, i, 859) has employed tuberculin injections in the treatment of tuberculosis of children, employing the opsonic power of the blood to determine the proper dosage and the proper interval between the injections. Before the injections the index was always lower than normal; throughout the injections it was kept at a higher point than normal. A high opsonic index is no contra-indication against the injections, particularly if the patient seems very low; the opsonic power is steadied, and though it may rise no higher, clinical improvement is usually made manifest. The adult dose is $\frac{1}{2000}$ mg.; children between ten and twelve may be given $\frac{1}{8000}$, at five years $\frac{1}{4000}$ mg., and at one year from $\frac{1}{8000}$ to $\frac{1}{12000}$; it is always safer to begin with a dose rather too small than too large. The intervals between injections are best kept at two weeks as long as the reaction is prompt. The index is examined before and after exercise, an injection is then given, and the examination made again in twenty-four hours, seventy-two hours, one, and two weeks afterward. The details of a number of cases are given, among them being cases of tuberculous dactylitis and superficial abscess, of tuberculous glands, of psoas abscess, of tuberculous joint disease, of abdominal and pulmonary tuberculosis. He sums up his article by stating that in tuberculin we have a most valuable remedy for localized tuberculosis. There is nothing dramatic in its effect, but with proper dosage a steady up-hill progress occurs both in the local conditions and in the general health. This improvement corresponds with an increase of opsonic power as shown by the alternate improvement and relapse in superficial lesions with the rise and fall of the opsonic index of the blood. Tuberculin is also of value in less localized infection especially if nutrition be not greatly impaired. With marked wasting and general illness no good results should be expected; yet, under such conditions, tuberculin may be the turning point in a down-hill course, so that unless the lesions are known to be widespread it is still worthy of trial. Tuberculin cannot take the place of surgical procedures, but should be used in conjunction with these. Caseous material must always be removed and this is best done when the opsonic index is high. If tuberculin is given sufficiently early, many cases would escape surgical interference. Secondary infection, always present with open tuberculous lesions generally lessens with improvement in the tuberculous process. Tuberculin treatment should only be undertaken by those who have given it special study.

OBSTETRICS.

UNDER THE CHARGE OF

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Retention of the Membranes through the Presence of Submucous Fibroid.—KREBS (*Arch. f. Gynäk.*, 1907, Band lxxx, Heft 2) reports the following case: The patient had a flat pelvis, and had been for some time in unsuccessful labor, the child perishing. Delivery was finally effected by craniotomy. A small piece of membrane was retained, and upon attempting to remove this it was found adherent to a small submucous fibroid. This was subsequently removed without especial difficulty, and with no hemorrhage. The patient made a good recovery.

MICHAUK'S case (*Inaug. dissert.*, Leipzig, 1866) was somewhat similar to the foregoing. His patient was a primipara, above the average age, and delivered by forceps. A piece of membrane was retained, and bleeding occurred. Upon investigation the uterus was found to contain a tumor the size of the fist, to which the membranes had been adherent. They were loosened and removed, and forty-four days after the patient's delivery the tumor was expelled in a necrotic condition through the vagina.

In BOISSARD'S case (*Bull. de la Soc. d'obst. de Paris*, 1902) a fibroid the size of a hen's egg was discovered after labor, to which the chorion was adherent near the placenta.

KNOOP (*Münch. med. Woch.*, 1903, No. 21), in a case terminating by spontaneous expulsion of the child, delivered the placenta and membranes by expression. In the membranes he found a fibroid tumor the size of a pigeon's egg. The mechanism of the adhesion of the membranes to these tumors seems to be atrophy of the decidua by the pressure of the tumor followed by adhesion of the membrane.

The Influence of Narcotics on Uterine Contractions.—KURDINOWSKI (*Arch. f. Gynäk.*, 1906, Band lxxx, Heft 2) investigated, by experiment and clinical observation, the influence of chloroform, chloral, morphine, scopolamine, and atropine, upon the contractive power of the uterine muscle. It was found that none of these had an appreciable effect upon uterine contraction. He also experimented with, and observed the effect of, Viburnum prunifolium. This drug has had considerable reputation as a remedy for checking uterine contractions. Kurdinowski found that in any but practically poisonous doses this drug, like the others mentioned, failed to effect uterine contractions.

The Formation of Decidua in the Ovary in Intra-uterine Pregnancy.—HORMANN (*Arch. f. Gynäk.*, 1906, Band lxxx, Heft 2) has demonstrated, and illustrates by microscopic photographs, the presence of fine intracellular fibers, syncytium and centrosomes, in the ovary during normal pregnancy. These observations may throw some light upon the possibility of ovarian pregnancy.

The Effect of Operation and also of Hemorrhage upon the Pregnant Patient.—Neu (*Arch. f. Gynäk.*, 1906, Band lxxx, Heft 2) reports the following cases: Case I, a primipara, between the fifth and sixth months of pregnancy, had repeated bleeding from varicose veins at the entrance to the vagina. Although her condition seemed otherwise good and there was no essential difficulty in the birth, which was spontaneous, the child was stillborn, and no apparent cause could be assigned for this except the repeated hemorrhage. In Case II a pregnant patient was found to have multiple cysts with nodules in the vagina. Excision was practised, followed by free bleeding, which required the use of a tampon to control it. This patient gave birth to a macerated fœtus. In Case III the vagina was almost occluded by the scars from a former labor. Operation was performed, and was complicated by hemorrhage. In this case the pregnancy remained without interruption. In Case IV, a multipara between five and six months pregnant had empyema of the gall-bladder, with peritonitis. Incision and drainage were practised and were followed by recovery. Spontaneous labor afterward occurred, after which the gall-bladder was removed and adhesions of the intestines liberated. This patient made a good recovery.

Innervation of the Uterus.—Roith (*Monats. f. Geburts. u. Gynäk.*, 1907, Band xxv, Heft 1) has studied the nervous supply of the uterus. He found upon minute dissection that the uterine muscle is stimulated by nerve fibers which arise from local ganglia in the connective tissue of the pelvis and also of the cervix.

Placenta Prævіæ.—Burger-Graf (*Monats. f. Geburts. u. Gynäk.*, 1907, Band xxv, Heft 1) contributes an interesting paper upon this subject. In 44,676 births, 344 cases of placenta prævia were observed, being 77 per cent., or 1 in 130. The reports of other clinics give a frequency of from 1 in 58 to 1 in 1564. As regards age, placenta prævia is most frequent between the years of thirty-one and thirty-five. It is very much more common in multipara, 88.3 per cent. of these patients being multiparæ, and 11.7 per cent. primiparæ; 16 per cent. of the multiparæ were in the second pregnancy. Central placenta prævia is most frequent in multiparæ, and the tendency to this complication increases with repeated births. This variety is least frequent in primiparæ. In central placenta prævia only 31.3 per cent. go to full term; 16 per cent. were delivered before viability, and 52.6 per cent. had premature labor. In lateral placenta prævia the patient goes to term most frequently. Next to this comes partial placenta prævia, while central placenta prævіæ naturally interrupts pregnancy most often. As to the time in gestation when central placenta prævia develops, it is most frequent in the eighth, ninth, and tenth months. Partial placenta prævia is most common in the ninth month, and lateral placenta prævia in the tenth month.

There seems to be some relation between placenta prævia and abnormality of the pelvis, as in 13.7 per cent. of these cases the pelvis was not normal. Twin pregnancy also predisposes to placenta prævia, and eight cases of twins occurred among the patients reported. As regards the presentation of the fœtus, the vertex presented in 69.2 per cent., transverse and oblique presentations occurred in 21.1 per cent., and

breech presentation in 9.4 per cent. As might naturally be expected, the majority of these cases did not terminate spontaneously. In 81.3 per cent. some obstetric operation was necessary, while spontaneous birth occurred in the remainder. As regards treatment, Burger-Graf does not favor the use of the tampon, and in this he differs from many observers. The reasons lie in the fact that the tampon causes separation of the placenta, and thus increases bleeding. Its action is slow and uncertain, and the patient may lose blood and strength almost imperceptibly during its employment. In lateral and partial placenta prævia he urges the rupture of the membranes.

To prepare for delivery of the patient, he prefers the use of the elastic bag. In central placenta prævia, he would tear through the placenta, and then insert a bag distending it as completely as possible; 25 cases treated satisfactorily by this method are reported. He also employs combined version as being especially safe and efficient; 83.8 per cent. were delivered by this method, the average time consumed being two hours and nineteen minutes for each. In 99.1 per cent. of cases, bleeding stopped as soon as the version was complete. If the head was very low, and sufficient dilatation was present, he employed the forceps, but this occurred rarely.

As regards the management in the third stage of labor, in 70.5 per cent. the expectant plan was followd. In 9.4 per cent. the placenta was expressed by Credé's method; in 18.9 per cent. the placenta was manually delivered. After the placenta had been removed a gauze tampon was inserted in the uterus in but 7.3 per cent.

[We do not understand why the tamponing of the uterus with gauze was employed so rarely after the uterus was empty. In our experience, danger of hemorrhage occurs when delivery is complete. This bleeding comes from sinuses in the lower portion of the uterus and from vessels developed in the lower uterine segment with an abnormal attachment of the placenta. This bleeding can only be controlled by pressure, for the contraction of the upper expulsive segment of the uterus does not reach these cases. We believe it to be of great importance that the uterus, cervix, and vagina be thoroughly packed after delivery in all forms of placenta prævia, and in our experience, if this precaution be taken, postpartum bleeding does not occur.]

The general mortality among these cases was 5.85 per cent. So far as placenta prævia was concerned, it caused a mortality in central placenta prævia of 15.9 per cent.; in partial of 4.1 per cent; in lateral of 3.2 per cent; 8 cases of pyemia occurred, and 20 patients were delivered by operation, version being performed in 17. The puerperal period was afebrile in 88.8 per cent.; 5 of the cases had fever from causes not connected with the genital tract. The maternal morbidity is given as 9.6 per cent. Of the children, 45.1 per cent. were born living, and 54.9 per cent. were stillborn. Those children had the best chance of surviving who were born in spontaneous labor.

GYNECOLOGY.

UNDER THE CHARGE OF
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Formation of Hematocele.—MAENNEL (*Zentralbl. f. Gynäkol.*, 1907, No. 11, p. 305) presents a brief but suggestive note on the encapsulation of blood within the peritoneal cavity, based on a study of 48 cases of hematocele. Observers have differed as to the explanation of the fact that the blood is not absorbed, some referring it to the coagulability, others to the admixture of pus, while others advance the theory that in cases of ectopic gestation the peritoneum is in a state of chronic inflammation which destroys its normal power of absorption. Experiments in animals show that pure blood is promptly absorbed by the intact peritoneum, even when large coagula form.

Maennel's own deductions are as follows: All the cases of ectopic pregnancy observed were tubal abortions, the hemorrhage being due to erosion of a vessel by the growth of the impregnated ovum, with resulting bleeding into the wall of the tube. If only a little blood escapes slowly the process of encapsulation begins in the loose connective tissue of the dilated tube. The slight envelope thus formed is replaced by lymphocytes and fibroblasts, which invade the thin membrane surrounding the coagulum and develop into connective tissue. When the organized blood clot is afterward expelled from the tube and comes in contact with the healthy peritoneum, instead of being absorbed, it sets up an inflammation resulting in the formation of more or less general adhesions. [This study in pathology only emphasizes a fact upon which the writer has long insisted, that a comparatively small percentage of cases of ectopic gestation terminates fatally if not handled immediately by the surgeon. This does not mean that a tubal abortion does not constitute a clear indication for operation, but that the surgeon too often plumes himself on snatching a patient from the jaws of death, when she was not in any danger at all.—H. C. C.]

Injuries to the Bladder.—ROITH (*Beit. z. Geb. u. Gyn.*, Band x, Heft 1 u. 2), from experiments on animals and clinical observations, concludes that the vessels and nerves of the bladder are quite tolerant of injuries. Even after ligating the main arteries and veins of the pelvis lesions of the organ, produced artifically, healed quickly on account of the free collateral circulation. In order to continue its functions it seemed necessary to preserve only the ganglia in the bladder-wall and pelvic connective tissue. In animals the functions were restored within from twenty-four to forty-eight hours after section of the nerves; in the human subject from two to four weeks are necessary. In Roith's opinion the necroses of the bladder sometimes observed after hysterectomy for cancer of the uterus are due not to injury of the vessels, but to the way in which the wound is treated. Necrosis never occurs when

the raw surface on the bladder is covered with peritoneum and does not remain in contact with a tampon. Hence the importance, in the radical abdominal operation, to suture the peritoneum anteriorly and to avoid drainage as much as possible. The use of the catheter is advised.

Laparotomy for Retroflexion with Pregnancy.—KUSTNER (*Monats. f. Geb. u. Gyn., Band* xxv, Heft 2) reports the case of a primipara, aged twenty-three years, who a year before entering the clinic had had an incomplete abortion resulting in localized peritonitis and fixation of the retroflexed uterus. She was admitted on account of ischuria, due to pressure of the impacted pregnant uterus (four months), which could not be replaced under narcosis. The abdomen was opened and numerous slight adhesions were found attaching the uterus to the adnexa and rectum. These were separated, and the organ was replaced and kept in position with a pessary until after the patient's convalescence, when the ring was removed. The uterus remained anteflexed until the end of the pregnancy. Kustner concludes that in cases of incarceration of the pregnant displaced uterus no time should be lost in relieving the pressure on the bladder, usually by inducing labor if possible and subsequently performing laparotomy.

Observations on Ruptured Ectopic Pregnancy.—HAIM and LEDERER (*Monats. f. Geb. u. Gyn.*, Band xxv, Heft 2) report 27 cases, the average age of the patients being thirty and a half years; 50 per cent. were multiparæ and only 4 women were nulliparæ. The adnexa were diseased in about one-half of the cases, gonorrhœal infection being the common cause. Rupture occurred between the second and third months in the majority of the cases, the direct cause being erosion of the tubal wall by a growing of the placental villi. The symptoms in 16 cases were metrorrhagia, abdominal pain, rapid pulse, vomiting, and dulness on percussion. Haim and Lederer condemn explorative curettement and vaginal section as aids to diagnosis. Free blood should be removed on opening the abdomen, but the operation should not be unduly prolonged for this purpose. The routine use of the Mikulicz tampon is advised. Only 4 patients succumbed, the average period of convalescence being twenty-six days. Normal pregnancy followed in several instances. [We have introduced this paper in order to express our disapproval of the deductions. Were they based on an analysis of 100 cases they would doubtless be different as regard both diagnosis and treatment. In spite of the favorable statistics, most operators will condemn the use of drainage in cases of intraperitoneal rupture.—H. C. C.]

Sterility.—In a discussion of this subject before the Hamburg Obstetrical Society (*Zentralbl. f. Gynäkol.* No. 13, 1907, p. 364) SEELIGMANN stated that his views had not changed during the last fifteen years, as he still believes that the principal cause of sterility in women is defective development of the uterus and ovaries, of which the conical cervix is a visible indication. This condition is usually associated with a diminution of the normal alkaline discharge, which is favorable for the vitality and activity of the spermatozoa. He has noted a con-

siderable number of successful results following incision of the cervix and the subsequent use of alkaline douches.

PROCHOWNICK asserted that in one-third of all unfruitful marriages the husband has azoöspermia, resulting from a previous gonorrhœal epididymitis. One-third were due to gonorrhœal infection of the wife by the husband. In the remaining third pelvic inflammatory conditions play an even more important part than do neoplasms.

New Method of Ventro-suspension.—LIEPMANN (*Zentralbl. f. Gynäk.*, No. 6, 1907, p. 169) believes that Olshausen's method of suspending the uterus by the round ligaments is the ideal one. He modifies the latter's operation by drawing the loop of the ligament through a slit in the peritoneum and fixing it to the muscle by silk sutures. The advantages claimed for it are more permanent fixation, greater mobility of the uterus, and a more nearly physiological position.

Results of Myoma Operations.—SARWEY (*Arch. f. Gynäk.*, Band lxxix, Heft 2) reports 430 cases from the Tübingen Clinic in the course of seven years. The mortality after abdominal operations was between 4 and 5 per cent., after vaginal from 5 to 6 per cent., and after conservative operations about 6 per cent. Among 360 cases the tumor had undergone degeneration in 57 (6 sarcomatous), and in 104 cases there were visceral complications, cardiac degeneration being noted in 32. In 94 cases accompanying disease of the uterus and adnexa was observed. 300 patients were kept under observation subsequently. Nervous and atrophic conditions were seldom observed when both ovaries were removed (30.8 per cent.). Even when one or both ovaries was left typical climacteric disturbances were noted in 28 per cent.; hence Sarwey's inference that the benefit derived by the patient from sparing the ovaries after removal of the uterus is more than counterbalanced by the dangers of their subsequent degeneration.

In 25 cases of conservative myomectomy other tumors developed in 4; 3 patients became pregnant and 1 had rupture of the uterus at the site of the cicatrix. Of the 275 patients in whom a radical operation was performed none complained of the cessation of menstruation. Sarwey believes that the importance of preserving the functions of menstruation and conception has been exaggerated, and that the radical operation is preferable.

DERMATOLOGY.

UNDER THE CHARGE OF

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The Radiotherapeutics of Ringworm.—SABOURAUD (*Brit. Jour. of Dermatology*, June, 1906) describes at some length the method of treating ring-worm by the *x*-rays employed at the St. Louis Hospital,

Paris. The current used for exciting the Crook's tubes is derived from static machines and the tubes employed are self-regulating ones encased in strong steet-iron lanterns lined on the inside with a thick layer of ebonite. Metallic cylinders, all of the same length, but of varying diameters are used to localize the applications to the areas it is desired to depilate. The length of these localizers is so arranged that when the scalp is applied to the external orifice it is exactly 15 cm. from the anticathode. The areas to be rayed are carefully mapped off on the scalp with ink in such a manner that the same area is not rayed twice. Each patch is given a single exposure of sufficient length to produce fall of the hair without dermatitis. The length of the exposures is determined entirely by means of the radiometer invented by Sabouraud and Noire, pastiles of Bristol paper coated with an emulsion of platino-barium cyanide, which are placed midway between the surface to be rayed and the anticathode. From the beginning of treatment the entire scalp is daily painted with a weak tincture of iodine which insures local protection and prevents infection of healthy parts. If, through failure in the technique, a second exposure becomes necessary, this is only made after the expiration of a month. Since the adoption of radiotherapeutics the length of time required to cure ringworm has been greatly lessened. The average duration of treatment was formerly about twenty-seven months; it now may be as little as six weeks.

Origin and Structure of Moles.—WILFRED S. FOX (*Brit. Jour. of Dermatology*, March, 1906) states, in making concluding remarks on the subject: (1) That moles which show the typical column of nevus cells are epidermal in origin; (2) that there is a rarer variety of soft moles which show us typical nevus-cell arrangement, and whose origin is uncertain, possibly mesoblastic; (3) that the most cases of nevo-melanoma are nevo-carcinoma; (4) that melanomas do arise in the skin entirely apart from moles; (5) that Cohnheim's view of the origin of malignant growths is not borne out by the foregoing observations of the histology of nevo-melanoma; (6) that the pigment appears to be closely connected with the prime cause, by reason of which moles become malignant, whatever that cause may be.

Total Alopecia Following the Application of Cantharides.—P. F. BARTON (*Lancet*, October 24, 1905) reports the case of a young man who presented a bald area the size of a shilling on the back of the head, which was considered to be of trichophytic nature rather than alopecia areata. It was painted with liquor vesicatorius (*Br. Pharm.*) twice in eight days. About eight days after the second application intense œdema of the scalp, face, neck, and upper chest set in. Soon there occurred a universal exanthem and hematuria. In the further course of the disease the hairs of the entire body and the nails fell out. At the end of nine months the nails grew in again, but the hair did not grow in, although the general health was restored.

The Treatment of Staphylococcic and Tuberculous Lesions by the Inoculation of the Corresponding Vaccines.—THOMAS HOUSTON and J. C. RANKIN (*Proceedings Ulster Medical Society*, Belfast, December 5, 1906, reprint) give an extended article on this subject, including the method of preparing the test emulsions of staphylococcus or other similar

microörganisms. The method adopted was that of Wright and Douglas, as described in their several publications. A series of cases of cutaneous diseases (acne, furunculosis, etc.) due to staphylococcus and to tubercle bacilli (lupus, etc.) are given, the results of treatment being in many instances strikingly favorable. The authors express themselves with caution and professional modesty, but the result of several years' experimental work incline them to agree with Wright's estimate of the value of this method, who states that "we have, in the power of raising the antibacterial power with respect to any invading microbe, out of all comparison, the most valuable asset in medicine."

The Blood in Relation to Skin Diseases.—THOMAS HOUSTON and J. C. RANKIN, of Belfast (*Brit. Med. Jour.*, October 6, 1906), give the results of work done by them in which the blood, using Prof. A. E. Wright's methods of examination, gave important indications for treatment. One case, illustrative, may be quoted. The man had suffered for five years from staphylococcic lesions. It was found that his "opsonic" power was low, and that it could be raised by injections of staphylococcic vaccine, and that while his opsonic index was high the lesions always improved. He received seven or eight injections, which almost completely freed him from any cutaneous lesions, except a little persistent eczema on his wrists. Ten days' treatment with sodium lactate caused this to entirely disappear. After inoculations practically all the cases cited rapidly improved, though some relapsed; in a few the failure was obviously due to faulty procedure. The inoculation of the vaccine employed must be neither too large nor too small. Thus, in a case of acne with abscesses, inoculations with from 0.5 c.c. to 1.25 c.c. (used every day or every other day) of vaccine containing 1,200,000,000 dead staphylococci proved to be too large dosage, the curve of the opsonic index not being observed. In lupus if the opsonic index is persistently low the case will not do well with the Finsen light nor with any other treatment. If by carefully regulated inoculations, however, we raise the opsonic power, the improvement is marked. In those dermatoses associated with serous effusions, in which the coagulability of the blood is found diminished, the soluble salts of lime have been rapidly beneficial.

The Perborates in the Treatment of Diseases of the Skin.—HERXHEIMER and IPSEN (*Arch. f. Dermat. u. Syph.*, Band lxxxiii, Heft 1) report their experience with the use of the perborates of zinc, magnesium, and sodium in the treatment of various diseases of the skin. These are new preparations which contain considerable quantities of oxygen, which is slowly set free when in contact with the skin. The zinc perborate was employed in salves and pastes containing from 2 to 25 per cent. of the salt. A large number of cases was treated with these salves and pastes, chiefly eczema in various stages. The authors conclude that the chief indication for the use of the remedy is found in dry eczema with infiltration, it being contra-indicated in all acute forms of the disease, and in the weeping stage of the chronic forms. Trial was made of the magnesium perborate with the view of avoiding the irritation which sometimes followed the use of the zinc salt, but there was but little difference between the action of the two. The perborate of sodium was found too irritating in eczema, but was employed with good effect in

acne as a kind of paste made by adding a handful of the salt to a half-liter of water and allowing it to stand a day before using. This salt was also found useful in the treatment of hyperidrosis.

The Action of Radium on Malignant Neoplasms.—W. DEANE BUTCHER (*Archives of the Röntgen Ray* No. 76) states that in his opinion the fact has been well established that small superficial neoplasms, such as lupus and cutaneous carcinoma, may be destroyed by the radiations of radium. "A wart, a lupous nodule, a syphilitic infiltration, a rodent ulcer, or a patch of carcinoma will simply wilt and wither away under the influence of the Becquerel rays, like an uprooted weed under the action of sunlight." Radium, like the Röntgen radiations, has a selective influence on young, immature, and rapidly growing tissue. It is difficult to explain the mechanism or to frame any reasonsable hypothesis which will account for this withering action of the ethereal waves on the elements of abnormal tissue. The first action of radium is apparently to cause a spasm of the bloodvessels, which may eventuate in permanent blanching of the part as in the treatment of nevi. Later there may be congestion, skin reaction, and still later telangiectasis, just as from an overdose of Röntgen rays. In short, the problems are the same as those of radiotherapy. Butcher thinks that a small, superficial, circumscribed lesion may be as accurately, certainly, and speedily attacked by radium as by Röntgen rays. It is by no means the case that the most powerful and costly specimens of radium are required for every case of radium therapy. Pigmentation of the skin has been known to follow exceedingly minute doses of the radium radiation. Wichmann, of Hamburg, found that pathological tissues, such as carcinoma, lupus, and fibroma, absorb a greater proportion of the rays than does healthy tissue. Radium succeeds in some cases when the Röntgen rays have failed to benefit. Even in the last stages of carcinoma, when ulcerative changes are rapidly spreading, one occasionally notes a marvellous arrest of the ulcerative process after exposure to the Becquerel rays, even in cases in which the Röntgen rays have proved of no value. Reference in the article is made to the recorded cases of Lassar, Robert Abbe, and MacKenzie Davidson in various diseases, especially carcinoma. The whole subject is full of interest and of promise.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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On the Origin of Anthracosis of the Lungs.—Since the publication of the work of Calmette's pupils, Vansteenberghe and Grysez, upon the intestinal origin of pulmonary anthracosis, the conclusions which they

came to have been ardently disputed and by some denied. BEITZKE (*Virch. Arch.*, 1906, clxxxvii, 183) among others has repeated the experiments of Vansteenberghe and Grysez and has arrived at diametrically opposite conclusions. Beitzke comes to the same conclusions as did Arnold in 1885, namely, that anthracosis of the lung is caused by aspiration of coal pigment. Beitzke finds that when india ink is injected into the peritoneal cavity of guinea-pigs and rabbits, the pigment is taken up partly by the lymphatics of the omentum, partly by those of the diaphragm, and is carried to the lymph nodes above the diaphragm and under the sternum. When the cells of these glands are saturated with pigment, the particles of india ink pass through the glands into the thoracic duct, whence they are carried to the blood stream. A general pigmentation of the organs of the body follows, in which, however, the lungs are not nearly so extensively pigmented as the spleen, the liver, and the bone-marrow. Anthracosis of the lungs could not be produced by merely feeding rabbits, guinea-pigs, and a dog with coal dust mixed in their food; and following the administration of india ink to dogs through an œsophageal tube there was no pigmentation of the lungs except in one dog who struggled violently during the operation and certainly aspirated pigment. Rabbits fed through gastric fistulæ did not show the slightest sign of pigment in the lungs. On the other hand, aspiration of soot, with or without ligation of the œsophagus, always gave rise to pulmonary anthracosis. In the last experiments the bronchus leading to one lung was closed, and afterward the animals were allowed to inhale soot. The lung to which there was free access of air showed deep an extensive pigmentation, while the other lung, to which the closed bronchus ran, was partially collapsed and totally free from pigment.

Blood Formation in Severe Anemia and in Leukemia.—MEYER and HEINEKE (*Deut. Arch. f. klin. Med.*, 1907, lxxxviii, 434) have devoted much time to the microscopic study of the organs in lymphatic, myelogenous, and mixed-cell leukemias, as well as in cases of pernicious anæmia which were atypical, inasmuch as myelocytes and undifferentiated lymphocytes were seen in the blood. They conclude that lymphatic and myelogenous leukemia are very different processes; for in one there is a general growth of the lymphoid tissue of the body, while in the other the lymphoid tissue remains passive, and is even compressed by the newly formed myeloid tissue. These myeloid growths arise from the cells of the organs, but not from the lymphoid cells. In the spleen the myeloid cells develop from indifferent pulp cells. In the liver the myeloid growth corresponds to the blood formation in the fœtus, the white cells arising in the perivascular spaces, the red cells in the blood-vessels. The myeloid transformation in the spleen, liver, and lymph nodes was also seen in cases of pernicious anemia, and in one case of aplastic anemia it was present to a remarkable extent. This is to be considered as a compensatory process to carry on the function of the bone-marrow, which is in some way seriously affected. It is, in its nature, a distinct reversion to the embryonic form of blood formation. This process of blood regeneration outside the bone-marrow may be seen in certain cases of severe anemia following acute infection, and may be brought about in animals by the production of anemia by means of various poisons.

The Influence of Veratrine on the Cardio-inhibitory Action of the Pneumogastric.—BUSQUET (*Jour. de phys. et de path. gén.*, 1907, ix, 50), experimenting with injections of veratrine in the frog, finds that this drug throws out of function very quickly the action of the vagus nerve upon the heart. Two minutes after the frogs received veratrine, stimulation of the vagus caused but very slight lengthening of the systoles, and three minutes after the dose faradization of the vagus had no influence whatsoever upon the heart's action. In such mammals as the dog, the rabbit, and the guinea-pig the same results were obtained, though the influence of the drug was more fleeting than in frogs. Unlike the action of atropine, the heart rate is not increased. The experiments did not show whether veratrine acts on the nerve itself or on the muscle of the heart.

The Differential Diagnosis between Pneumococci and Streptococci—RICHARD LEVY (*Virch. Arch.*, 1907, cxxxvii, 327), after experimenting with blood agar as suggested by Schottmüller, the inulin-serum media of Hiss, and the litmus-nutrose-agar devised by E. Fränkel, comes to the conclusion that with none of these culture media can one differentiate accurately all streptococci from certain types of pneumococci. In devising a new and surer method he has put to practical use some observations made by Neufeld, who has described a specific bacteriolytic action of bile upon pneumococci. Levy employs, instead of bile, sodium taurocholate. The test is very simple, and consists in mixing a 5 per cent or 10 per cent. solution of sodium taurocholate in bouillon with an equal amount of a bouillon culture of the organism to be tested. As a control, equal quantities of sterile bouillon and the bouillon culture are mixed. The tubes are shaken vigorously. If the organism belongs to the pneumococcus or streptococcus mucosus groups the turbid bouillon cultures become clear; if the organism is a streptococcus the culture retains its original cloudiness. This method he has tried on 35 strains, and claims that it is the most satisfactory one for the differentiation of these bacteria. He concludes that Streptococcus mitior of Schottmüller is not to be definitely distinguished from Streptococcus longus, and that Streptococcus mucosus is a variety of pneumococcus and closely allied to it.

NICOLLE and ADIL-BEY (*Ann. de l'Inst. Past.*, 1907, t. xxi, 20) in another series of experiments have arrived at much the same results as Lævy. They find that bile obtained from several different animals and that sodium choleate cause prompt solution of pneumococci when added to cultures of this organism. A large number of bacteria are partially refractory and the streptococci and staphylococci completely refractory to the bacteriolytic action of bile.

The Experimental Production of Atypical Epithelial Growth and the Origin of Malignant Tumors.—FISCHER (*Münch. med. Woch.*, 1906, liii, 2041) states that the almost regular occurrence in certain cancers of subepithelial inflammatory infiltration of the connective tissue led him to try to produce artificially some chronic inflammation under the epithelium which would cause an increased activity of the epithelial cells. After using various substances without much success he was finally able, by injecting a suspension of scarlet-R in oil under the epithelium of rabbits' ears, to produce a very remarkable picture. Besides

the usual cellular infiltration, hyperemia, and giant-cell formation, interesting changes occur in the epithelium. After a few days increased mitosis is visible in the germinal layer, even atypical mitosis, and the epithelial layer increases in thickness. Soon the germinal layer sends out processes into the depths which reach out and surround the oil droplets. The connective tissue is seen to be studded with columns and nests of cells, in appearance like the cancroid pearls. The picture is histologically indistinguishable from that of a flat-celled carcinoma. Areas of cells frequently pierce the cartilage of the ear, and in one instance a nest of epithelial cells was seen growing in the lymph space. Fischer thinks this overgrowth is not a result of the inflammatory condition of the connective tissue, for other oils do not have the same effect, but a distinct chemotactic action of the scarlet-R upon the epithelial cell. The oil slowly becomes absorbed and epithelial cysts are formed; the cells become horny and cholesteatomatous structures are formed, which finally break externally and the contents are discharged. As closely as the histological picture resembles carcinoma we have not a true malignant growth. There is no destructive overgrowth, and when the attracting substance has been removed growth stops and the cells degenerate. Up to the present a chemotactic action has been established for the leukocytes only. For such substances as exert a specific chemotactic action upon a special group of cells Fischer introduces the term attraxines.

From this important observation Fischer develops numerous theoretical considerations relating to the origin and growth of malignant tumors. He agrees with the Cohnheim-Ribbert view of the histogenesis of tumors from aberrant cells, presuming the development of a specific attraxine to start the cells into activity and then to stimulate them to overgrowth. He lays great emphasis too upon the important role attraxines may play in the normal embryological development of the organs; and, indeed, considers them the cause of the embryological or postembryological aberrant cells from which, according to Cohnheim and Ribbert, tumors spring. The presence, of a great variety of attraxines which such views assume finds its analogy in the endless number of specific bodies being discovered in the blood. Ehrlich, in quite a different way, has come to the conception of an unknown substance, the "specific x-substance," in the blood necessary for the growth of transplanted tumors. Fischer identifies these with his attraxines. It has been shown too that tumors are transplanted with greatest ease upon animals of the same strain, and, as peculiarities in metabolism are the features most often inherited, Fischer sees in this another prop for his hypothesis.

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